ICD 08241

Amateur Radio

SERVING AMATEUR RADIO SINCE 1945
AUGUST 1995

CQ

1945 CQ 1995
50th Anniversary

In This Issue

A Simple, Multi-Band Array By W6SAI

Building Low-Cost Vertical Antennas

Useful Antenna Tuner Tips From W1FB

A Horizontal Loop Antenna For 75/40 Meters

CQ Reviews: Cushcraft's ASL 2010 Log-Periodic

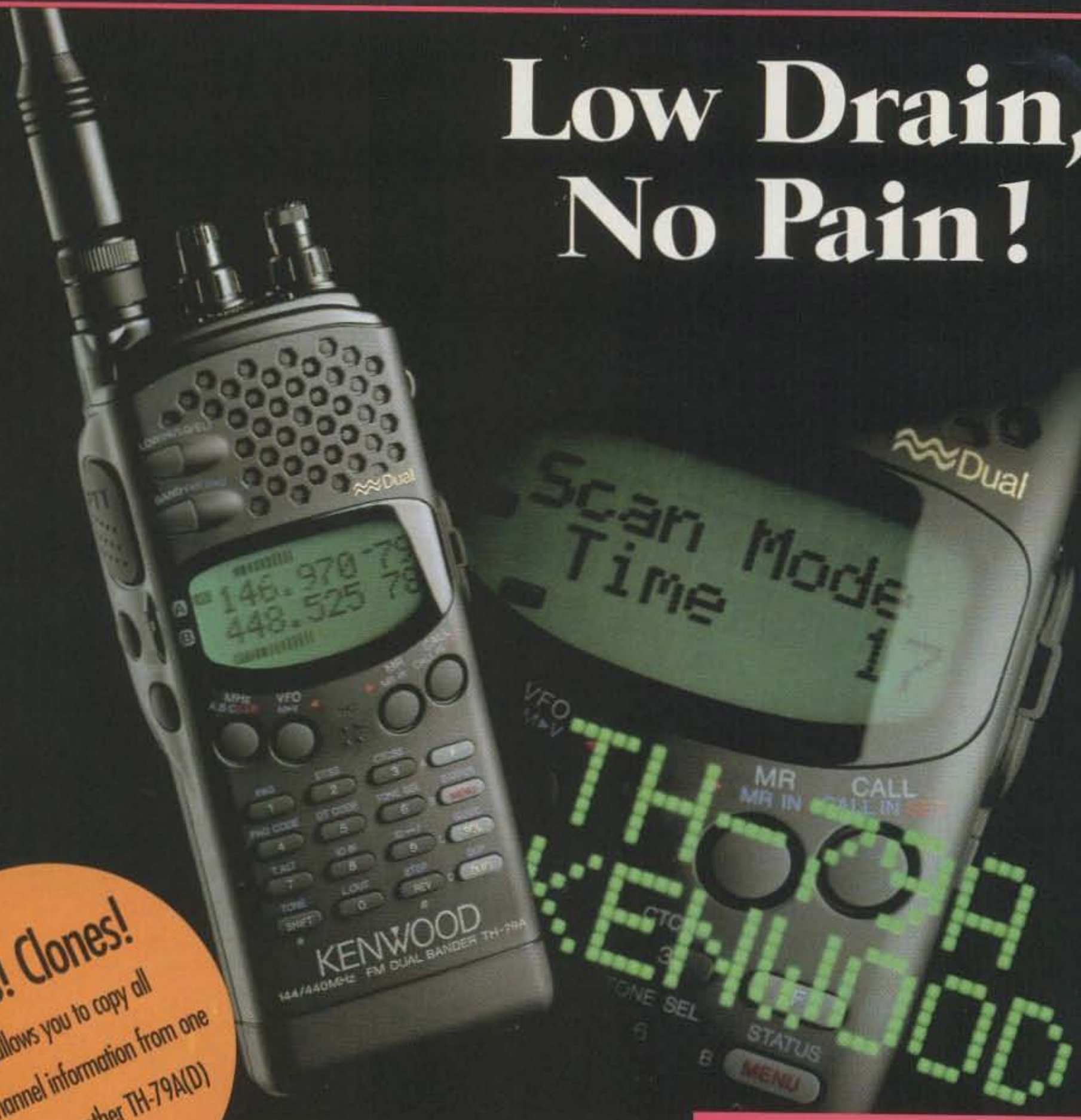
U.S. $3.9

0 74851 08241 6

cover: Ron Stockton, N0RR, Nederland, CO

DIO AMATEUR'S JOURNAL

Low Drain, No Pain!



Clones! Clones!
Cloning allows you to copy all memory channel information from one TH-79A(D) to another TH-79A(D)

TH-79A (Deluxe)
FM DUAL BANDER

Information at your fingertips. Everything you need to know about operating the new TH-79A(D) FM dual-bander (144MHz/440MHz) can be viewed in its unique dot-matrix LCD with alphanumeric display. No need for the manual. In addition to this innovative guide function, the TH-79A(D) sports a user-friendly menu system, providing easy access to the many powerful features of this slim-line handheld transceiver. Such as 82 non-volatile memory channels with ID, DTSS and page functions, and a DTMF memory function for autodial operation. Full-crossband duplex operation is available, as is the ability to receive two frequencies on the same band (VHF+VHF or UHF+UHF) simultaneously. And thanks to the FET power module, long hours of operation are possible on one charge. With the TH-79A(D), transceiver technology enters the 21st century.

Features — *NEW 5-WATT VERSION NOW AVAILABLE*

- 2.7 approx. output (144MHz), 2W approx. output (440MHz) from MOS FET power module and supplied 6V battery; 5W approx. output using optional PB-34
- Dot-matrix LCD with menu/guide system
- 82 non-volatile memory channels with ID
- DTMF keypad with memory function
- DTSS (Dual-Tone Squelch System) with page
- Built-in CTCSS tone encoder/decoder
- Automatic band change
- Power-on call sign display
- Auto repeater offset (VHF)
- Wide-range flexible antenna
- Input overvoltage warning
- 3-position output power control
- Auto power-off and battery save function
- Time-out timer
- Memory channel lock-out (scan mode)
- Cross-band repeater function
- Page answer-back function
- Channel display function
- Wideband receiver coverage, including AM receive on the aircraft band*
- Clone function
- Modifiable for MARS/CAP use**

*Specifications guaranteed for Amateur bands only.
**Permits required. Specifications guaranteed for Amateur bands only.

KENWOOD COMMUNICATIONS CORPORATION
AMATEUR RADIO PRODUCTS GROUP
P.O. Box 22745, 2201 E. Dominguez St., Long Beach, California 90801-5745
Customer support/Brochures (310) 639-5300
Repair Locations/Parts (800) KENWOOD Bulletin Board Service (BBS) (310) 761-8284
KENWOOD ELECTRONICS CANADA INC.
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

95ARD-1138

KENWOOD

MIL-SPECS/TOP SPECS!

TM-241A

FM MOBILE TRANSCEIVER

Pure and simple, the concept reads like this: "rock-solid performance with straightforward operation, at an affordable cost". And Kenwood's TM-241A (144MHz) FM mobile transceiver symbolizes this perfectly.

Great looks and rugged construction are just the beginning. The TM-241A's user-friendly controls make mobile QSOs a snap, and a powerful 50-watt amplifier lets you work simplex with confidence or hit those distant repeaters. Reception specs are equally impressive: intermod characteristics have been improved* to reduce interference from strong adjacent band signals. Plus, there are 20 multi-function memory channels for programming combinations of frequency, sub-audible tone, and repeater offset.

So, if you're looking for true mobile performance, go back to the basics and reach for Kenwood's TM-241A.

Features

- 144-148 MHz TX, 118-174 MHz RX
- 50 watts RF output
- 20 multi-function memory channels
- Large LCD display with illuminated keys
- Full band scan, programmable band scan, memory scan with channel lock-out
- Time-operated & carrier-operated scan modes
- Built-in selectable CTCSS tone encoder
- Auto repeater offset
- Tone alert with elapsed time indicator
- DTSS for selective calling and paging (with optional DTU-2)
- Time-out timer
- Auto power-off with warning beeper
- Meets U.S. military standards for shock and vibration (MIL-STD 810C/D/E)*
- Modifiable for MARS/CAP use (permits required)

These specifications guaranteed for Amateur band only.
*Current K&K2 versions with serial number 5080000 or later.

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KENWOOD

94ARD-1072

DIAMOND ANTENNAS –
THE STANDARD BY WHICH ALL OTHERS ARE JUDGED

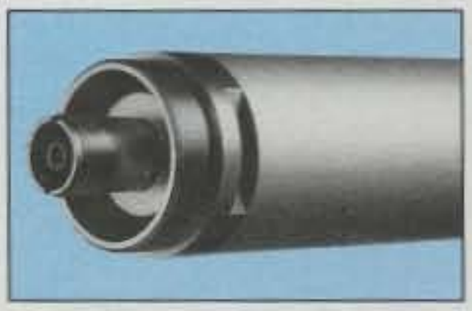
DIAMOND ANTENNA

ACCLAIMED AS THE TECHNOLOGICAL LEADER IN SINGLE & MULTIBAND ANTENNAS

●WIDE-BAND PERFORMANCE ●FACTORY ADJUSTED/NO TUNING REQUIRED
●HIGHEST GAIN ●UPS SHIPPABLE ●HIGH WIND RATING ●FIBERGLASS RADOME
●DC GROUNDED ●STAINLESS HARDWARE

X-500HNA

RUGGEDIZED BASE/ REPEATER ANTENNA



COAX CONNECTION AT BASE END

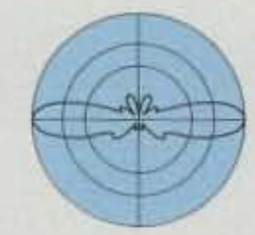
HEAVY DUTY BASE/ RADIAL ASSEMBLY

STRONG JOINT COUPLINGS

X series

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CONN.	HT. Ft.	RATED WIND/ MPH
X-50A	144/440	4.5/7.2	200	UHF	5.6	135
X-200A	144/440	6.0/8.0	200	UHF	8.3	112
X-300A	144/440	6.5/9.0	200	UHF	10.2	112
X-510NA	144/440	8.3/11.7	200	N	17.2	90
X-510MA	144/440	8.3/11.7	200	UHF	17.0	90
X-500HNA	144/440	8.3/11.7	200	N	17.8	90+
X-700HA	144/440	9.3/13.0	200	UHF	24.0	90
X-2200A	144/222	6.0/7.8	150	UHF	11.5	112
X-3200A	144/222/440	6.0/7.8/8.0	100/200	N	10.5	112
X-6000A	144/440/1240	6.5/9.0/10.0	100/100/60	N	10.5	112

BAND: 144=144 - 148MHz. 222=222 - 225MHz. 420=420 - 430MHz.
430=430 - 440MHz. 440=440 - 450MHz. 1240=1240 - 1300MHz.
* X510NJ :144 - 147 / 430 -440MHz

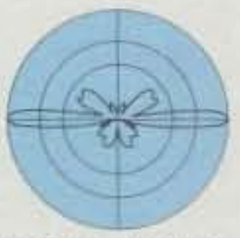


147MHz

445MHz

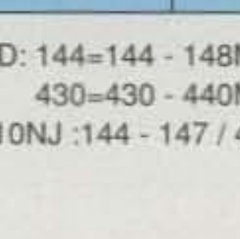
RADIATION PATTERNS FOR
X-500HNA/X-500MA/X-510NA

X510

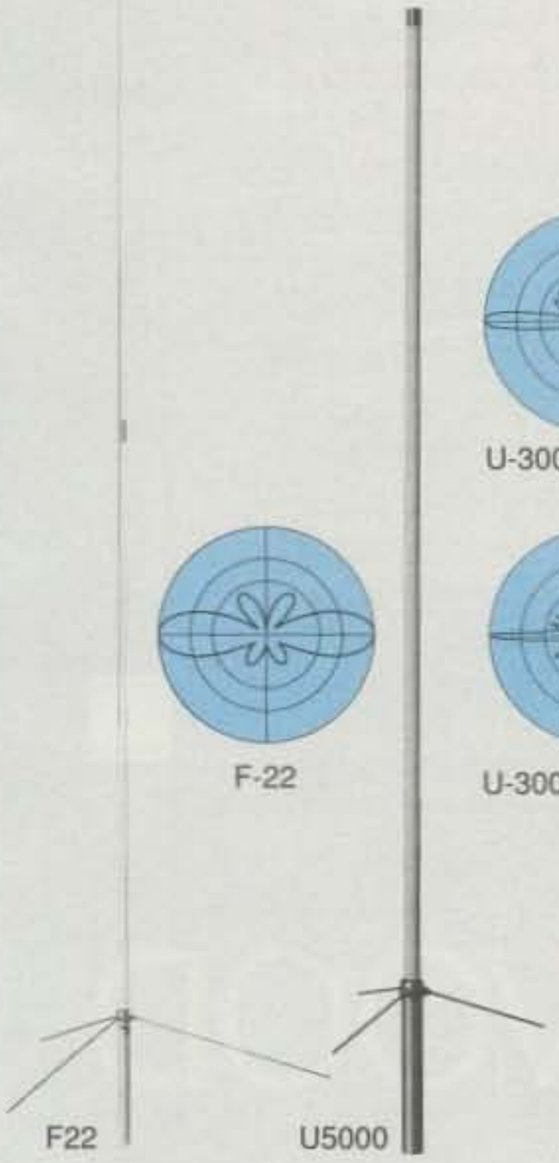


U-300A 440MHz

F-22



U-300A 1200MHz



F22

U5000

GH62

GH/F/U&V series

MODEL	BAND(MHz)	GAIN(dBd.)	WATTS	CONN.	HT. Ft.	RATED WIND/ MPH
DP-GH62	50	6.0	200	UHF	21.0	78
F-22A	144	6.7	200	UHF	10.5	112
F-23A	144	7.8	200	UHF	15.0	90
F-142A	222	5.5	200	UHF	6.0	110
F-718A*	440	11.5	250	N	15.0	110
F-1230A	1240	13.5	100	N	10.5	90
U-200A	440/1240	8.3/11.7	100	N	5.9	135
U-300A	440/1240	8.6/13.2	100	N	8.3	110
U-5000A	144/440/1240	4.5/8.3/11.7	100	N	5.9	135
V-2000A	50/144/440	2.1/6.2/8.4	150	UHF	8.3	110

*F-718A:440 - 450MHz, F-718J:430 - 440MHz, F-718L:420 - 430MHz

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The Radio Amateur's Journal

ON THE COVER: You just can't beat the view from one of the towers at the Nederland, Colorado QTH of Ron Stockton, NØRR! And Ron's signal isn't so bad either, as many can attest, having heard him crack one gigantic DX pileup after another.(Photo by Larry Mulvehill, WB2ZPI.)

AUGUST 1995 **VOL. 51 NO. 8**

FEATURES

HOW TO BUILD LOW-COST VERTICAL ANTENNAS FOR YOUR QTH — Phil Salas, AD5X — 13
CQ REVIEWS: THE S & S ENGINEERING PC1 PROGRAMMABLE COUNTER — Paul Carr, N4PC — 24
CQ REVIEWS: THE CUSHCRAFT ASL 2010 LOG-PERIODIC ANTENNA — Paul Carr, N4PC — 26
A 75 AND 40 METER HORIZONTAL LOOP ANTENNA — Sidney Rexford, W2TBZ — 32
ANTENNAS HATE ME! — John K. Munroe, W7KCN — 36
CQ SHOWCASE: NEW AMATEUR PRODUCTS — 40
THE 160-RV ANTENNA: A G5RV ADAPTER FOR 160 METERS — Thomas M. Hart, AD1B — 46
DOUG'S DESK: SOME ANTENNA TUNER TIPS — Doug DeMaw, W1FB — 48
ANTENNAS & ACCESSORIES: BOOK NOOK; ANTENNA AND COMPUTER NOTES — Karl T. Thurber, Jr., W8FX — 54
MATH'S NOTES: EAST-TO-IMPLEMENT, GENERAL-PURPOSE AUDIO AMPLIFIERS — Irwin Math, WA2NDM — 64
WORLD OF IDEAS: QRP ALIVE WITH THRILLS AND DX! — Dave Ingram, K4TWJ — 68
RADIO FUNDAMENTALS: A SIMPLE MULTIBAND ARRAY FOR 7, 10, 14, 18, AND 21 MHZ — Bill Orr, W6SAI — 72
VHF PLUS: LESSONS LEARNED FROM THE OKLAHOMA CITY BOMBING ROVER OPERATION — Joe Lynch, N6CL — 80
BILL'S BASICS: INTERNATIONAL AGREEMENTS APPLICABLE TO AMATEURS — Bill Welsh, W6DDB — 94
PACKET USER'S NOTEBOOK: WHAT'S A K-NET? — Buck Rogers, K4ABT — 100
WASHINGTON READOUT: INFORMATION BULLETIN BROADCASTING ON THE AMATEUR BANDS — Frederick O. Maia, W5YI — 120
THE 1995 CQ 160 METER CONTEST HIGH-CLAIMED SCORES — 126

DEPARTMENTS

CONTEST CALENDAR: CONTESTER'S GUIDE TO FINDING MULTIPLIERS; CONTESTS FOR AUG. AND EARLY SEPT. — John Dorr, K1AR — 88
AWARDS: STORY OF THE MONTH—WILL PHILLIPS, VE3FNM — Norm Van Raay, WA3RTY — 98
DX: NORTH KOREA — Chod Harris, VP2ML — 112
PROPAGATION: SUNSPOT PLATEAU, DX CHARTS FOR AUG. 15 THROUGH SEPT. 15 — George Jacobs, W3ASK — 130
ZERO BIAS — 4
ANNOUNCEMENTS — 6
HAM SHOP — 140

ZERO BIAS

AN EDITORIAL

There's something wonderful and magical about antennas. I don't know exactly what it is. Maybe in part it's trying to explain to the neighbors what it is. Somehow, with whatever the antenna is, the whole world opens up and is readily accessible from your shack. Of course, you can't call it a shack in front of your neighbors. It's more like a radio room or communications central. You even find yourself spinning a will-o'-the-wisp tale about geography, world politics, cultural exchange, and warm personal friendships with people you've never met. Oh, most of it is sort of true, and certainly possible, and most of all it fans the flame of our imagination wherein we can do anything.

If the neighbor or neighborhood is potentially hostile towards amateur radio, the antenna instantly becomes a passive device for shortwave listening—i.e., the BBC—or an exotic means of receiving classical music on FM from distant (but not too distant) cities. If the neighbors look as though they may not quite believe you, invite them in that evening for a special "broadcast" of an atonal version of the complete Ring Cycle with 31 variations. No one would sit through that—well, maybe no one.

The antenna itself is a thing of beauty and joy, regardless of the type. After all, everything radiates. It's just a question of how well. We all know ideally what the absolute best antenna height and configuration should be, but most of us have to be satisfied with quite a bit less. A lot of us just look longingly at the installations shown in *CQ*'s Amateur Radio Calendar and sigh. A few (especially here at the office) look and cynically remark, "Well, where they are, they need it." That's just east coast sour grapes. The truth is we all want that, too.

The one antenna fact almost every amateur can agree with is we really wouldn't like to see one pop up next door or even a few houses down. Beyond that, everybody has theories, preferences, and particular biases when it comes to antennas. There is always that longing however, that unspecified yearning for the next new antenna—the one that will make all the difference, the one that will break all the pile-ups, and the one that most certainly will put you on top of the Honor Roll—that keeps a lot of us going. There is nothing like the feeling of adding a new antenna to your QTH, standing back, and imagining all the new possibilities that suddenly have opened up to you.

Recently I took a week off as a sort of mini-vacation. My plans were simple: I was going to stay home and finally get around to working on my antenna farm. Years of preliminary work were going to pay off. Years of acquiring exquisite (and often heavy) hardware at hamfests were going to be worth all the aggravation of trying to bring it home past airport metal detectors and curious security people and all the wear and tear on my body. I would finally have answers to all the questions (and weird looks) from people at hamfests as to what I was going to do with all that stuff. Of course, I first would have to find a lot of it and retrieve it from all those out of the way places in my basement. The main thing is that I knew I had it.

I started this farm a number of years ago (on graph paper) and quickly incurred the wrath of the local power and phone companies when I wanted them to move the feeds to my neighbor's house. Both feeds crossed my property at a point where I wanted to put up (eventually) a scanner antenna. No, they wouldn't do it for that reason, but I was able to convince them that the feeders were too low and posed a threat which would involve all sorts of nasty things happening to me if anything came in contact with them. It took several weeks, but both were moved, leaving me clear space for a vertical in relative safety.

I had a great time finding and gathering all the hardware, arranging it, and finally using most of it. This past Dayton put me over the top with the acquisition of a terrific military-surplus ground system and some really neat mast clamps from Surplus Sales of Nebraska. The ground system proved to be a great buy, although it was a lot heavier than I thought. There was no way I could have dragged this thing back to the *CQ* booth, let alone talked Dick into letting me stuff it into the trunk of his car (he likes to drive to Dayton). Fortune smiled upon me when I spotted Joe Fairclough, WB2JKJ, nearby in the fleamarket. He was selling "good stuff" for his group, The Radio Club of Junior High School 22. Joe lives about 15 minutes away from me and was easily coerced into transporting the ground system in his truck. There's always a way.

The folks at Surplus Sales also wanted to know what I was doing with all the clamps I bought. Rest assured, they all are being used at the moment to support masts. So at least this summer some of my antenna fantasies are coming true and I'm actually using up the stuff I've been buying for years. What about you? Have you made good use of the summer and added to the radiation pattern from your neighborhood?

Perhaps you're still studying the situation and sending away for the latest antenna software package. There are plenty of books on the market, and I'm willing to bet that no matter where you live, there's no shortage of local antenna experts who will proffer up countless opinions on which route you should take. At some point, however, you have to stick your toe in the water and just try something. Antennas in a sense have always been our last frontier and constant variable.

If we could only change or add to or replace something in that area, everything else would be perfect. Sometimes antennas fulfill the dream of more—more bands, more gain, more things to listen to, and more opportunities for us to hear our own calls come back to us from some rare and exotic place. The exotic place can be one grid square over, the next state, or some scrimpet of rock partially covered with water at mean high tide.

With antennas, the main ingredients are imagination and desire, rather than postgraduate degrees and tons of esoteric test equipment. For the most part, just about everyone can handle the mechanics of simple antennas. It's measure, cut, bolt, tie, solder, and most of all patience. It's simple tools, eye-hand coordination, and average prehensile ability. We all can do it, enjoy it, and reap the benefits, which adds to the attraction of antennas.

The real beauty of antennas and antenna projects is just when you think that you've created the perfect (for you) installation, along comes something else that you can add, change, or modify. It never ends. I'm sure that I'll find some piece of exotic hardware at the next hamfest fleamarket that will get me going again collecting all sorts of good stuff for the next generation of antennas at my QTH. It's part of the concept of fun and enjoyment, while partially satisfying the needs of reality. It's the pull you feel when you scrounge around the shack and find a box with brand-new, plastic-wrapped PL-259s. Suddenly visions of spools of new cable appear and your imagination is soaring. All of this excitement can easily be generated by a simple connector, a couple of egg insulators, or even a few U-bolts. It's looking at this accumulation of stuff and seeing the possibilities emerge.

There is a side benefit to all this fun, imagination, and to some, seemingly wasted effort. You can find yourself learning what works and what doesn't (and why). You can see and appreciate what goes into some of our commercial products as well as develop a sense of meaning to the buzz words we all like to use. We make them wonderful and magical. Antennas don't light up, don't make noise, and have few if any moving parts. Yet we build them, buy them, stack them, and even go to court over them. That's the magic and that's the fun.

73, Alan, K2EEK

Say You Saw It In CQ

Data Controllers Put You In Control

PK-900

- Dual simultaneous ports.
- Automatic signal idenfication.
- 9600 bps modem option available.
- 8-pole Chebyshev bandpass filter.
- Dual-port Gateway: Packet to AMTOR, Packet to PACTOR, and Packet to Packet.
- Twenty software selectable modems.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- 16-level gray scale fax with opt. software.
- Same modes as the PK-232MBX.
- Full PACTOR Memory ARQ.

DSP-2232
DSP-1232

- DSP-1232 has two switchable ports.
- DSP-2232 has two simultaneous ports.
- Same modes as the PK-232MBX.
- Includes modems for satellite use.
- Automatic signal identification.
- 17K Packet, PACTOR, and AMTOR MailDrop.
- DSP-2232 has dual-port Gateway: Packet to AMTOR, Packet to PACTOR, & Packet to Packet.
- DSP-2232 features front panel LCD.
- Up/Down Doppler shift for PSK modems.
- 9600 bps modem included.

PK-232MBX

- Designed for multi-mode operation.
- Internal 1200 bps VHF modem.
- Automatic signal identification.
- 18K Packet, PACTOR, and AMTOR MailDrop.
- 2400 bps modem option.
- 8-pole Chebyshev bandpass filter.
- Modes: Morse code, Baudot, RTTY, ASCII, AMTOR/SITOR, PACTOR, VHF & HF packet, B&W fax receive/transmit, NAVTEX/AMTEX, and ARRL Information Services.
- Gateway as a node.

PK-12
PK-96

PK-12 Now Does GPS

- PK-96 is a 9600 bps packet-only controller with 9600 bps K9NG and G3RUH compatible direct frequency modulation and 1200 bps VHF packet.
- PK-12 offers 1200 bps VHF packet at less than 80 mA of power.
- PK-96 features true DCD state machine for open squelch operation.
- 32K RAM, easily expandable to 128K.
- KISS mode for TCP/IP compatibility.
- Control of third-party MailDrop traffic.

Call (800) 432-8873 for a complete catalog or information on a specific product. Contact your favorite amateur radio equipment dealer for best pricing.

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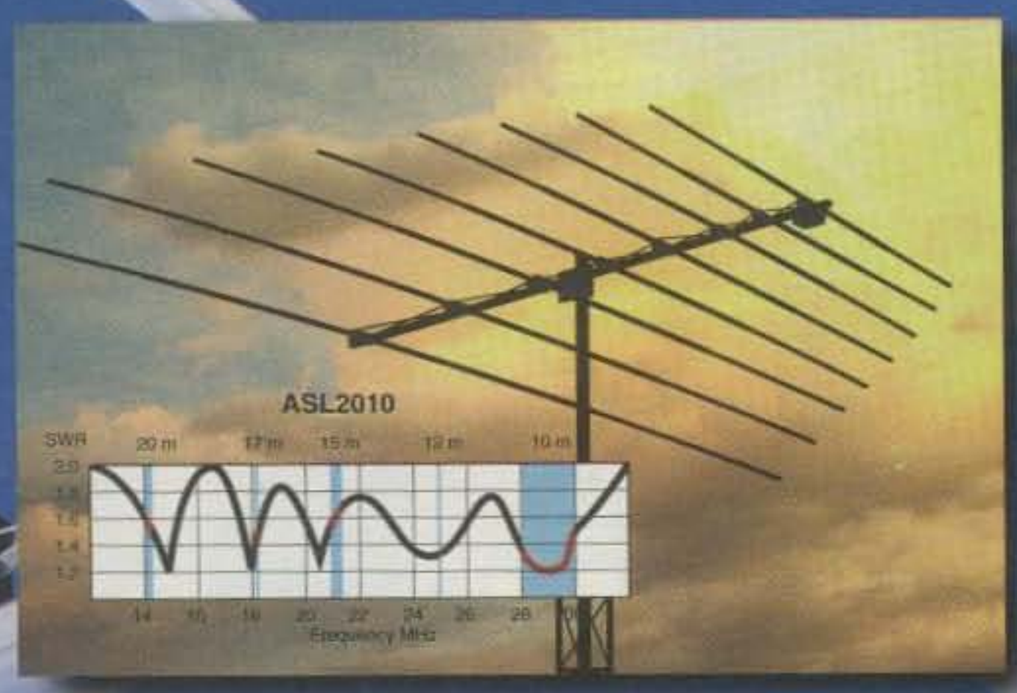
ASL2010 Log Periodic

5 Bands On A Boom You Can Manage

This all new log periodic antenna is the most cost effective, high gain, five band antenna on the market today. Skylog offers continuous operation from 13.5 to 32 MHz. Antenna gain and beamwidth are constant for uniform coverage from 10 through 20 meters. The ASL2010 is rated for continuous duty at full legal power.

Skylog is designed for maximum gain on a manageable 18 foot boom with only 10.1 square feet of wind surface area. All stainless steel hardware and rugged element design are only some of the many features that provide years of superior antenna performance.

Skylog ASL2010 is the smart choice for multiband HF operation.



- **Continuous five band coverage from13.5 to 32 MHz**
- **Constant gain over entire frequency range**
- **6.4 dBd gain, 65 degree beamwidth**
- **20, 17, 15, 12 and 10 meters with one antenna**
- **18 foot boom and 19.25 foot turning radius**

MODEL	ASL2010
Frequency, MHz	13.5-32
No. Elements	8
Forward Gain, dBd	6.4
Front to Back Ratio, dB	15-20
SWR 1.2:1 Typical	
2:1 Bandwidth	18.5 MHz
Power Rating, Watts	2000
3 dB Beam Width, Deg. E Plane	65
Boom Length, ft (m)	18 (5.48)
Boom Diameter, In (cm)	2.0 (5.08)
Longest Element, ft (m)	38 (11.58)
Element Center Dia, in (cm)	1.25 (3.18)
Turning Radius, ft (m)	19.25 (5.86)
Mast Size Range, in (cm)	1.5-2 (3.18-5.08)
Wind Load, ft^2 (m^2)	10.1 (.93)
Weight, lb (kg)	55 (25.5)

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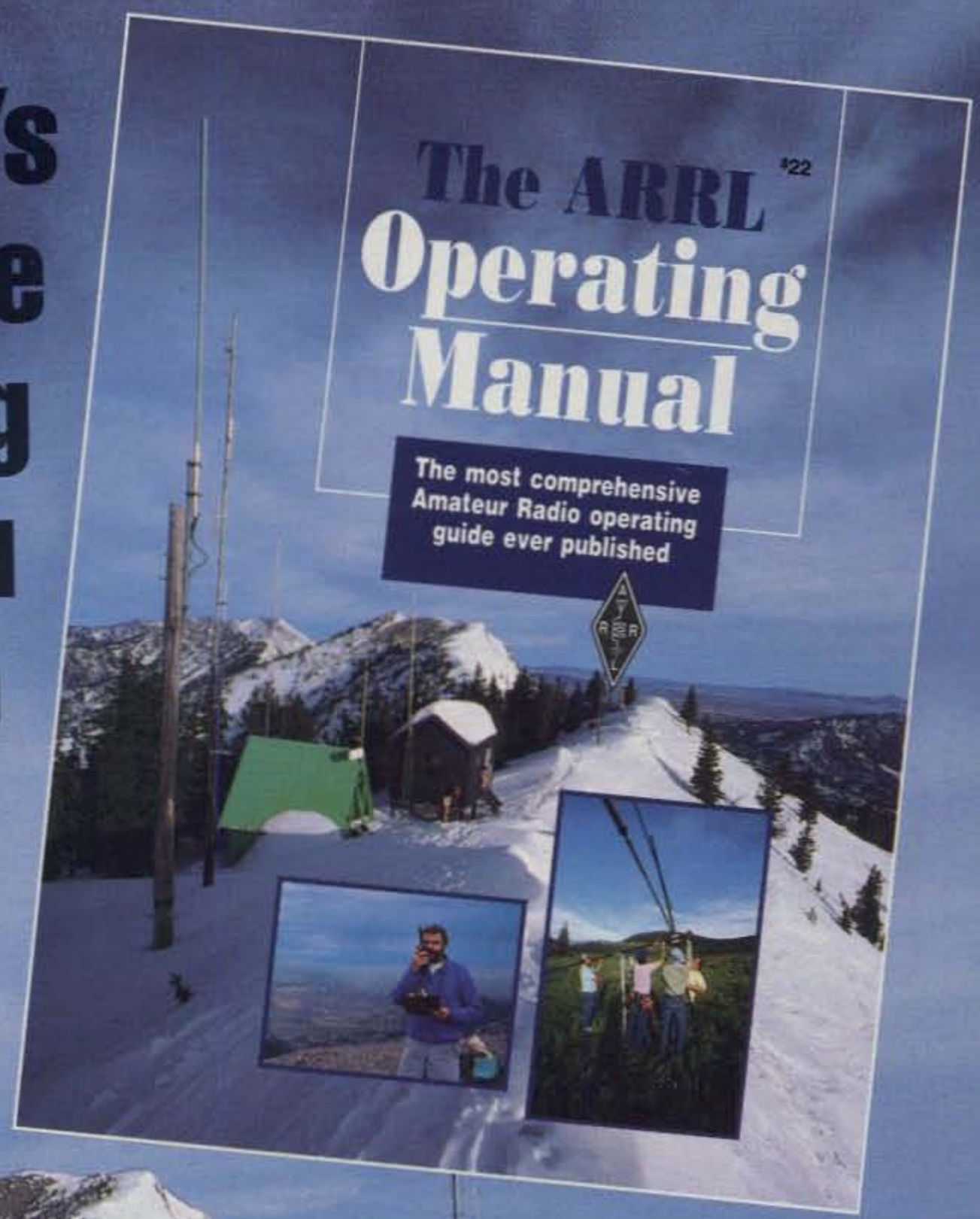

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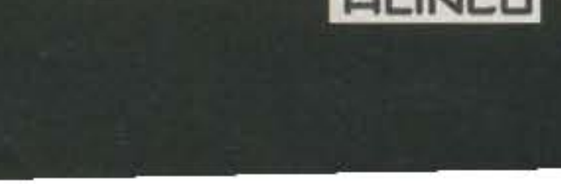

DR-610T

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It's time to head out to your local hardware store or Home Depot to pick up the components for your next antenna. AD5X shows us that it's not that hard and is a lot of fun.

How To Build Low-Cost Vertical Antennas For Your QTH

BY PHIL SALAS*, AD5X

In one of my previous articles ("Low-Cost Mobile Antenna Accessories From Plumbing Parts," *CQ*, June 1995, page 30) I described the ability to make low-cost HF mobile antenna accessories from plumbing parts available from your local hardware store. As it turns out, many of these same plumbing parts can also provide the means to build inexpensive base-station HF antennas.

This HF antenna effort started when I began looking into a low-cost 40 meter vertical antenna to help some new amateurs get on the air. Aluminum tubing is inexpensive and readily available from Texas Towers (800-272-3467 or 214-422-7306). However, I needed a simple way to build a base and base insulator, as well as a support bracket for the antenna. First let's look at a few characteristics of PVC pipe and aluminum tubing.

The PVC/Aluminum Tubing Connection

When we talk about PVC pipe, we talk about the inside diameter (ID) of the pipe. When we talk about aluminum tubing, we normally talk about the outside diameter (OD) of the tubing. For PVC pipe (schedule 40):

1. 1/2" PVC pipe has an ID of 0.6" and an OD of 0.85".
2. 3/4" PVC pipe has an ID of 0.8" and an OD of 1.1".
3. 1" PVC pipe has an ID of 1.05" and an OD of 1.3".

The Texas Towers catalog gives dimensions for all types of aluminum tubing. So now let's see how PVC pipe fits with standard aluminum tubing:

1. 1/2" OD aluminum tubing slides into 1/2" PVC pipe.
2. 1/2" PVC pipe slides into 1" OD aluminum tubing (0.884" ID).
3. 3/4" OD aluminum tubing slides into 3/4" PVC pipe.
4. 3/4" PVC pipe slides into 1.25" OD aluminum tubing (1.134" ID).

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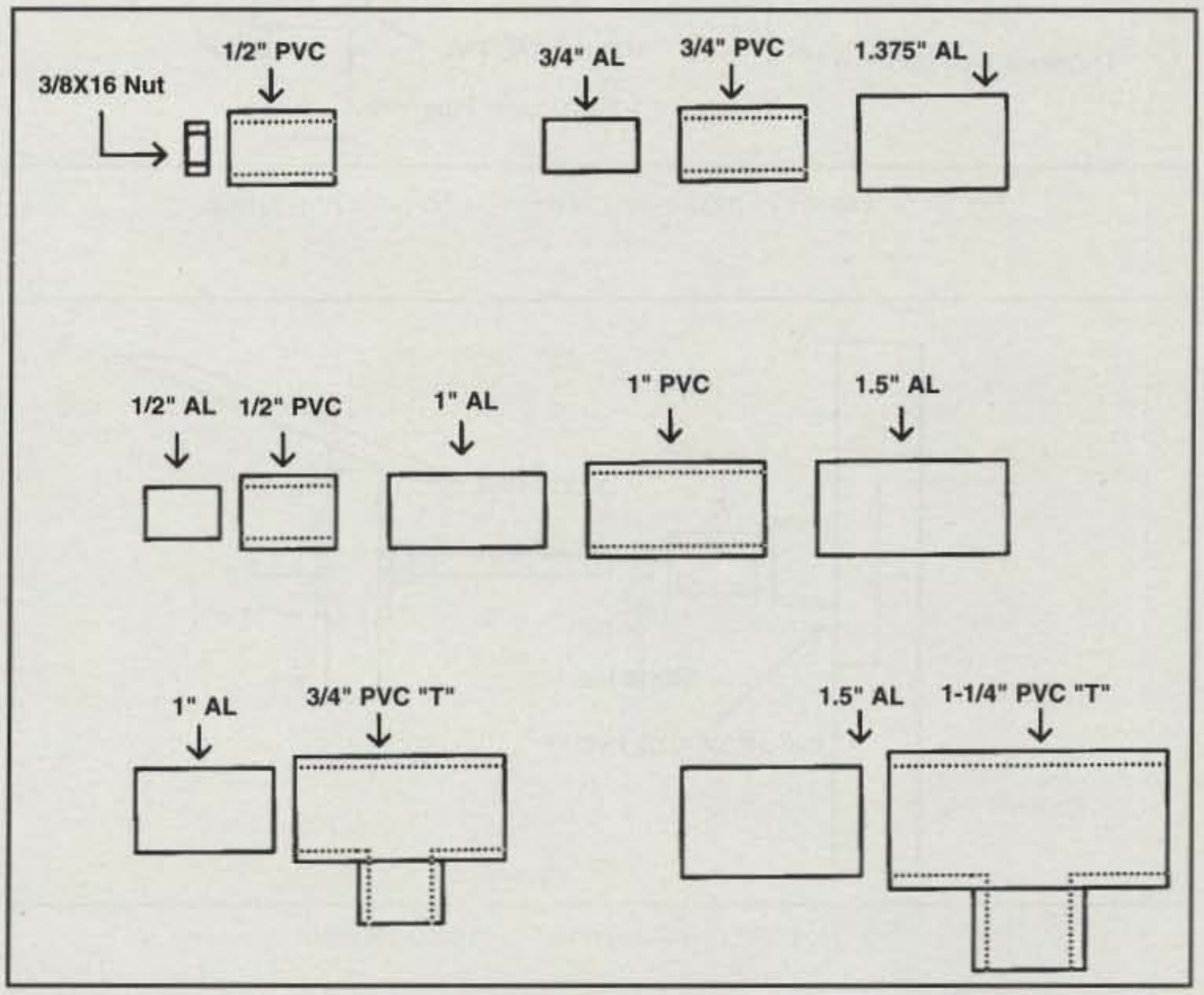


Fig. 1– Various aluminum-tubing/PVC-pipe combinations and configurations showing relative ID/OD relationships.

5. 1" OD aluminum tubing slides into 1" PVC pipe.
6. 1" PVC pipe slides into 1.5" OD aluminum tubing (1.384" ID).

Another interesting tidbit I found was that a 3/8 × 16 nut presses very nicely into a piece of 1/2" PVC pipe (using a vise makes this easy). And, PVC couplers and "T's" must pass the OD of the appropriate PVC pipe—i.e., a 3/4" PVC coupler has an ID of 1" (to pass the OD of a 3/4" PVC pipe), which means that a 1" aluminum tube will slide into it, and a 1 1/4" PVC coupler has an ID of 1 1/2" which means you can slide a 1 1/2" aluminum tube into it (you may need to read this a few times!). I have summarized these relationships pictorially in fig. 1.

A Simple 40/15 Meter Vertical Antenna

Now that we know all the above information, let's start out by building a vertical for 40 and 15 meters. A 1/4-wave vertical for 40 meters is approximately 33 feet long. This will also work well on 15 meters as a 3/4-wave vertical. This antenna length can be realized with either three 12 foot telescoping sections of aluminum tubing (1" OD, 0.875" OD, and 0.75" OD), or six 6 foot telescoping sections of aluminum tubing (1" OD, 0.875" OD, 0.75" OD, 0.625" OD, 0.5" OD, and 0.375" OD). The 6 foot sections may be more desirable for portable antennas. The dimensions of all antennas, traps, and

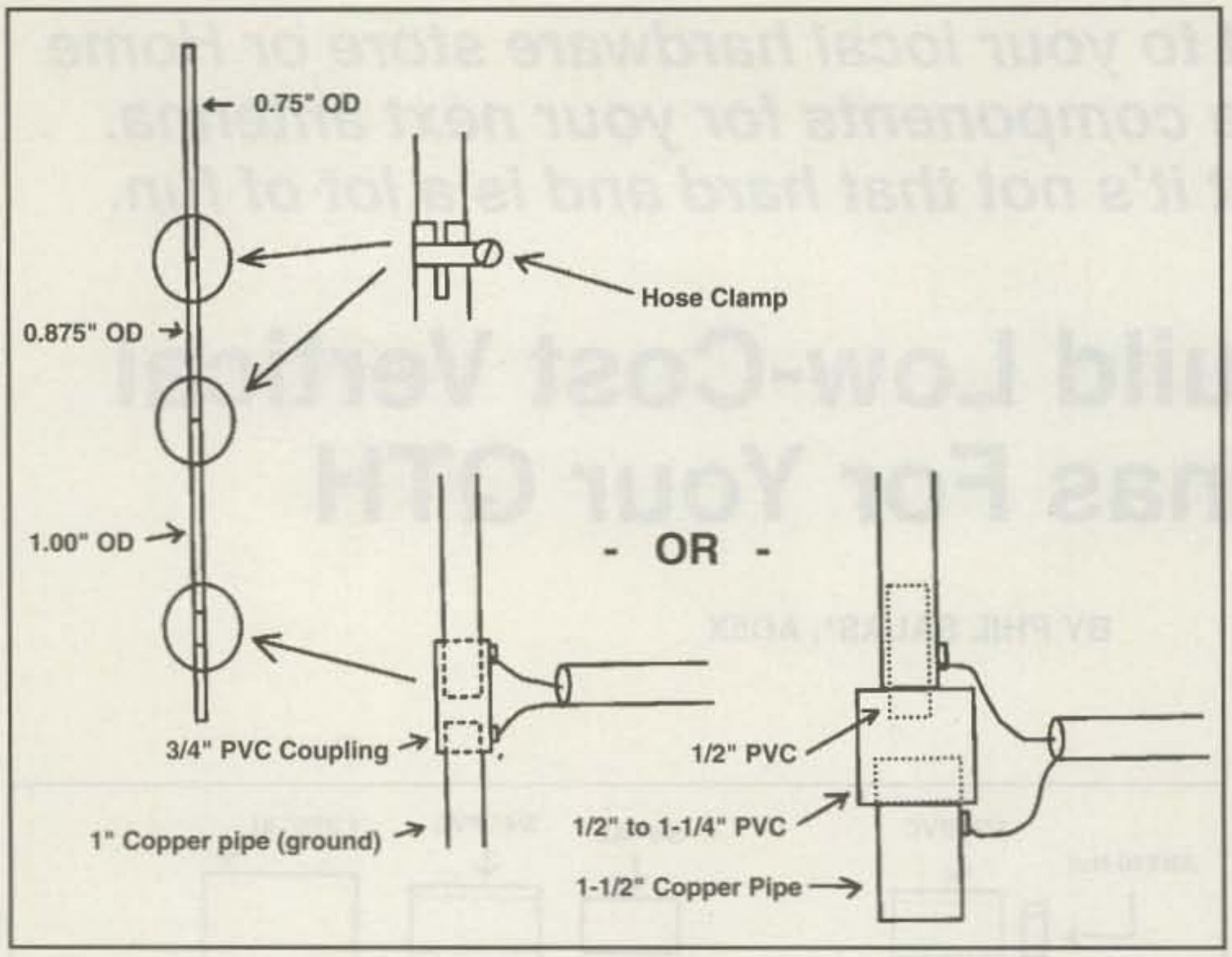


Fig. 2– Simple 40/15 meter vertical antenna construction details.

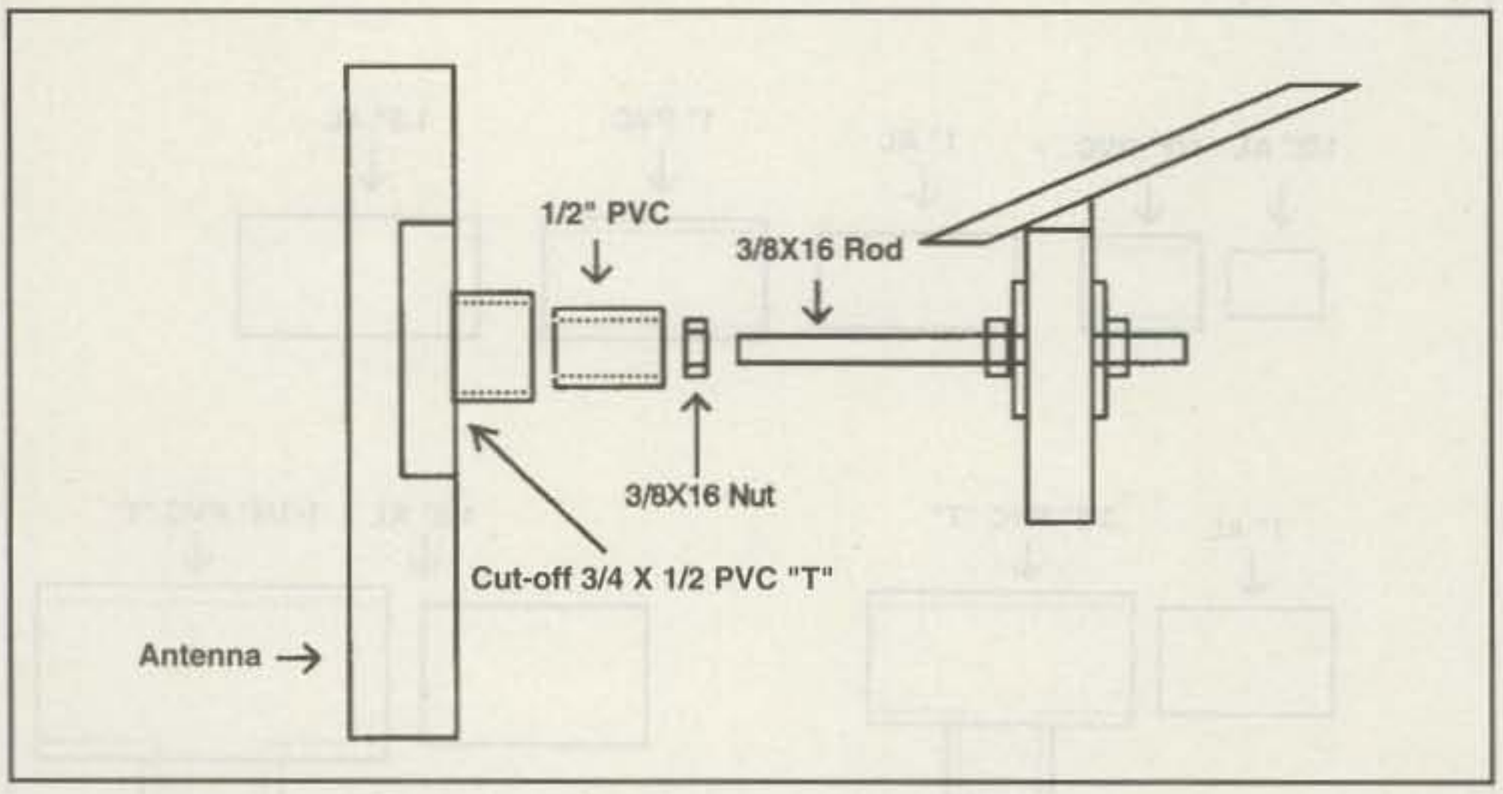
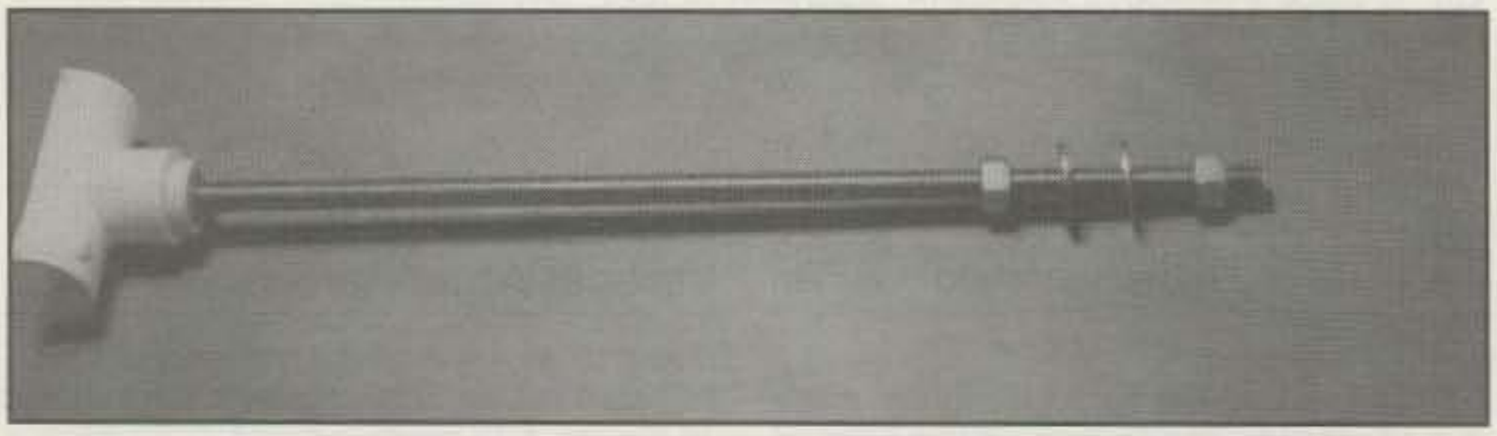


Fig. 3– A roof overhang antenna support system.



The completed roof overhang vertical support assembly as depicted in fig. 3.

coils used in this article assumes that the above three 12 foot tubes are used, however.

To attach the sections together, cut a 1 inch long slot in the end of the larger tubes with a hacksaw, and then use a stainless-steel hose clamp to compress the slotted tubing over the smaller tubing that slides into it. Always use stainless-steel hardware on aluminum tubing and brass hardware on copper tubing. Fig. 2 shows the antenna construction with two different ways to make the base.

Now how do we support the antenna? Actually, the antenna can be self-supporting if the base is made strong enough. The first base shown in fig. 2 can be self-supporting if the ground pipe is strong enough. In the second base shown a 1/2 inch wood dowel treated with outdoor varnish can be inserted into the 1/2 inch PVC base pipe to provide the necessary strength for self-support. In my case, the antenna was to be mounted close to the house, so I elected to support the antenna from the roof overhang. For this I used a 3/4" × 1/2" PVC "T" as shown in fig. 3. Remember that a 3/4" PVC coupling or "T" will encircle a 1" OD aluminum tube. I cut the 3/4" PVC "T" section lengthwise so that the 1" OD aluminum tube would rest in it. A tie-wrap can now be used to hold the aluminum tube to the sectioned "T." Next I cut off a one inch length of 1/2" PVC pipe and pressed a 3/8 × 16 brass nut into it with a vise. I added a little epoxy just to make sure the nut would stay put. Then I glued the 1/2" PVC pipe into the 1/2' "T" section as shown. I used a carpenter's level on the antenna to determine where to drill a 3/8" hole in the overhang. Finally, I used a 3/8 × 16 threaded brass rod, two 3/8 brass washers, and two 3/8 × 16 brass nuts to hold the assembly to the roof overhang as shown. I used the carpenter's level again to determine the adjustment length of the rod.

Preliminarily assemble the antenna by telescoping the three sections together and install the combination on the base. Use the stainless-steel hose clamps to keep the sections from completely sliding into each other. Rest the antenna in the cut PVC support and hold it in place with a tie-wrap. Finally, I wanted a DC connection from the antenna to ground to bleed off any static charges on the antenna. I built an RF choke using 41 turns of #16 enameled wire wound on a T200-2 torroid. This has a high enough impedance so that operation all the way down to 160 meters will eventually be possible.

That's all there is to it. Now all you need to do is put in all the radials you can, attach your coax, and adjust the antenna length for best VSWR in the middle of the 40 meter band. The VSWR on 15 meters should be good at this same antenna length. With the vertical resonant at 7.15 MHz, I achieved full 40 meter band coverage with a VSWR of less than 1.5:1, and full 15 meter band coverage with a VSWR of less than 2:1. Incidentally, check out the electrical section of your local hardware store for radial wire. I found 18-gauge stranded copper wire for 4¢/foot, or $14 for 500 feet. Also, I found a product called "Plasti Dip," which is made for coating tool handles. This stuff is great for weather-proofing your coax connection to your antenna as well as your coax connectors. I also used it to coat and seal the torroidal choke.

Resonance On Other Bands

How about other bands? Well, you can use this vertical on bands other than 40 and 15 meters with an antenna tuner, although you should use low-loss coax and/or a very short run of coax to keep from losing too much power in the coax when the VSWR is high (as it would be on 160, 80, and 20 meters). When the antenna is fully collapsed (around 12.5 feet total length), it works great on 17 meters with a VSWR of about 1.2:1 or less! The antenna length can be adjusted for 3/4-wave operation

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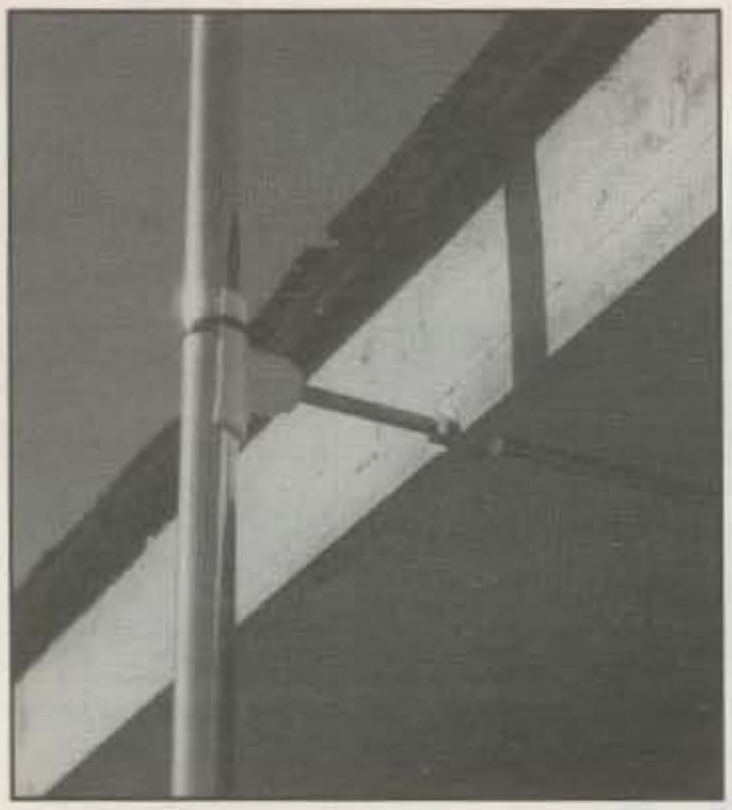


The vertical antenna is shown mounted to the roof overhang. Notice that the antenna is secured to the mount by a simple tie-wrap.

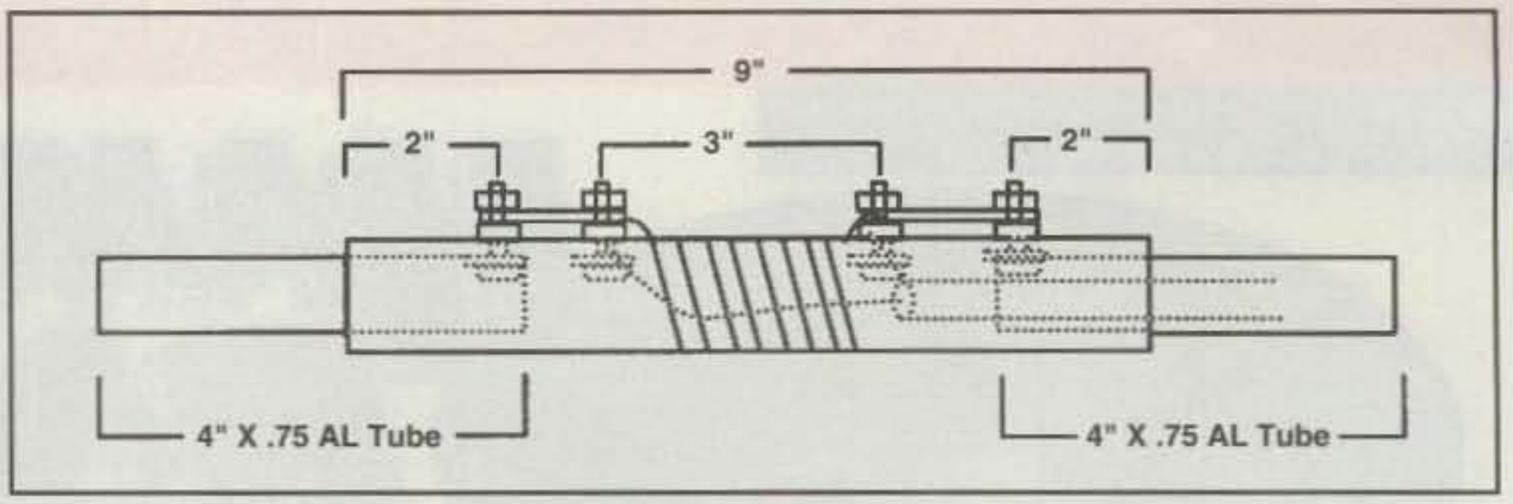


Fig. 4– Mechanics of assembled 14 MHz trap.

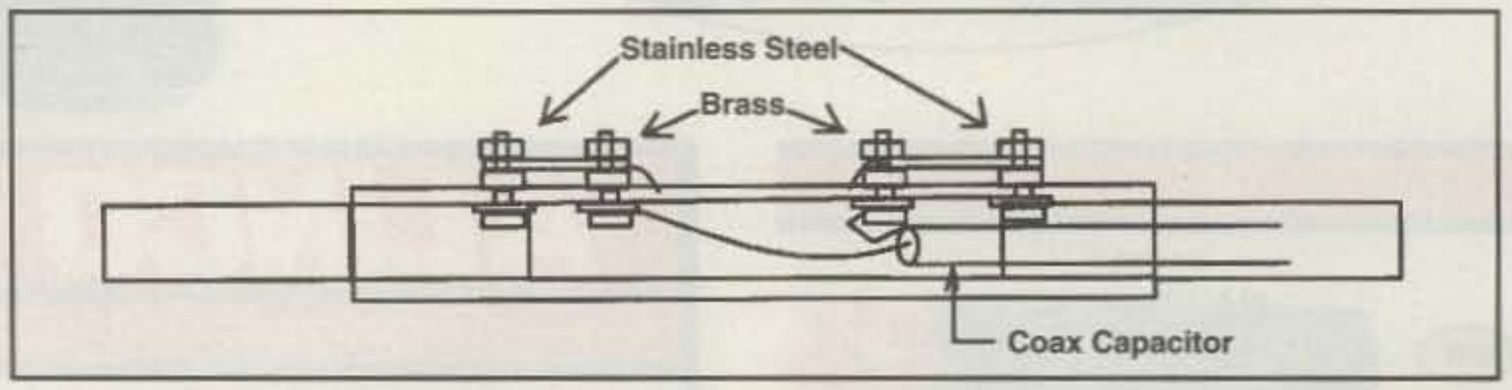


Fig. 5– Cutaway view of the 14 MHz trap showing the coax capacitor.

on 15, 12, and 10 meters and 1/4-wave operation on 40, 30, 20, and 17 meters. Finally, you easily can resonate this antenna on 160 meters without an antenna tuner with the Butternut 160 meter coil kit (around $60), and it will still also operate on 40 and 15 meters. This is too easy though. What else can we do?

A 40/20 Meter Antenna

Because of the current low sunspot activity, I decided to trade off 15 meters for 20 meters by adding a 20 meter trap into the vertical. A trap consisting of a 4.7 µH inductor in parallel with a 27 pF capacitor resonating at 14.1 MHz should do the trick. However, how could I build an inexpensive trap that could be inserted into the vertical antenna? After a little thinking, I came up with the design shown in figs. 4 and 5. This trap is made from two 4 inch pieces of 3/4" OD aluminum tubing removed from one end of the 12' 3/4" section, a 9 inch piece of 3/4" PVC tubing, some #18 stranded and insulated speaker wire, a piece of RG-58 coaxial cable, and some #8 stainless-steel and brass hardware. I used a standard nibbling tool to notch the two pieces of 3/4" OD aluminum tubing about a quarter inch so that they would fit over the stainless-steel screws as shown.

The 27 pF capacitor is made from an open-circuited piece of RG-58 coax. RG-58 has a capacity of 28.5 pF/foot. Take a one foot piece of RG-58, strip 1.5 inches of insulation off it, separate the inner conductor and braid, and solder the center conductor and braid to the head of #8 brass screws that are spaced 3 inches apart. With a little patience, you can fish the screws through the PVC pipe at the locations shown.

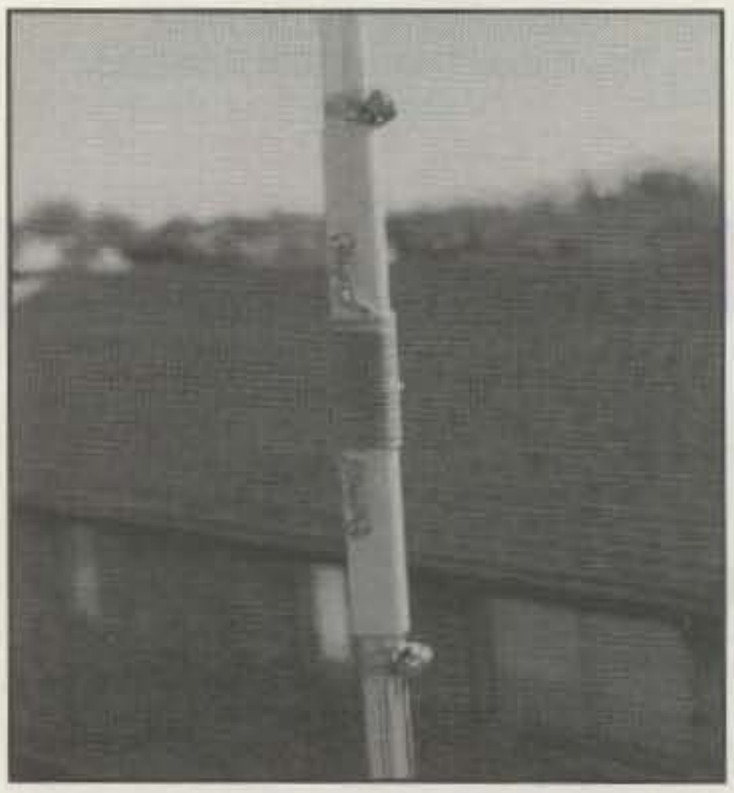
This will give you a capacitance very close to 27 pF. I used an Autek RF-1 SWR analyzer to trim the length to exactly 27 pF. Dip the open end of the coax cable in Q-dope or "Plasti Dip." This RG-58 capacitor will work fine for power levels up to 100 watts.

The inductor consists of 23 turns of #18 stranded speaker wire (Radio Shack) wrapped close wound over 2 1/2 inches of the PVC pipe with the ends connected to the brass screws from the coax capacitor as shown in the drawings and the photographs. After winding the inductor, I adjusted the turns spacing slightly so that the trap resonated exactly at 14.1 MHz as indicated on my old trusty Heathkit grip dip meter (I have a counter output on my grid dip meter to ensure accuracy). "Plasti Dip" was used to firmly hold the coil windings in place.

Now we need to mount the trap. Cut the 0.875" OD aluminum tube in half (the center tube), slot the ends of the tube with a hacksaw, and mount the trap at this point with stainless-steel hose clamps. Since the trap has the effect of electrically lengthening the antenna on 40 meters, I had to remove an additional 12 inches of tubing from the top 3/4" 12 foot tube (I had already removed 8 inches for the trap tubing end pieces). Now adjust the antenna so that the trap is 15'2" above the base of the antenna and the total tubing above the trap is 10'1/2". With these dimensions my measured performance was as follows:

Resonance/VSWR	Worst VSWR Across Band
7.13 MHz/1.3:1	1.8:1 @ 7.3 MHz 1.5:1 @ 7.0 MHz
14.2 MHz/1.1:1	1.3:1 worst case across entire band

If you want the 40 meter performance to be optimized over a different part of the band, adjust the top section (above the trap). Lengthening it will lower the 40 meter resonant frequency, and shortening it will raise the 40 meter resonant frequency. The 20 meter band will be unaffected. For those who prefer building coax traps, I rebuilt this trap as a coax trap by winding 10 turns of RG-58 close wound on the same form (refer to the photo). After a little adjustment of the turns spacing to get it to resonate at 14.1 MHz, I fixed the coax turns in place with "Plasti Dip."



This is what the 20 meter trap looks like when it is installed on the vertical antenna.

160 Meter Antenna

I mentioned earlier that you can make the untrapped 32 foot vertical operate on 160 meters with the Butternut 160 meter coil kit. However, I wanted to build a more optimum antenna for 160 meters. One better way of building a short efficient antenna is to center load it instead of base loading it the Butternut way. Why center loading? Because center loading increases the radiation resistance 2.25 times over a base loaded antenna. And since a short antenna has a low radiation resistance, we should see an increase in efficiency with center loading. At a 32 foot overall length, our antenna is only about 1/16th of a wavelength long on 160 meters. From the *ARRL Antenna Book*, the radiation resistance of an antenna shorter than 1/10th wavelength can be calculated from:

$$R = 273 \times (lf)^2 \times 10^{-8}$$

where: l = length in inches
f = frequency in MHz

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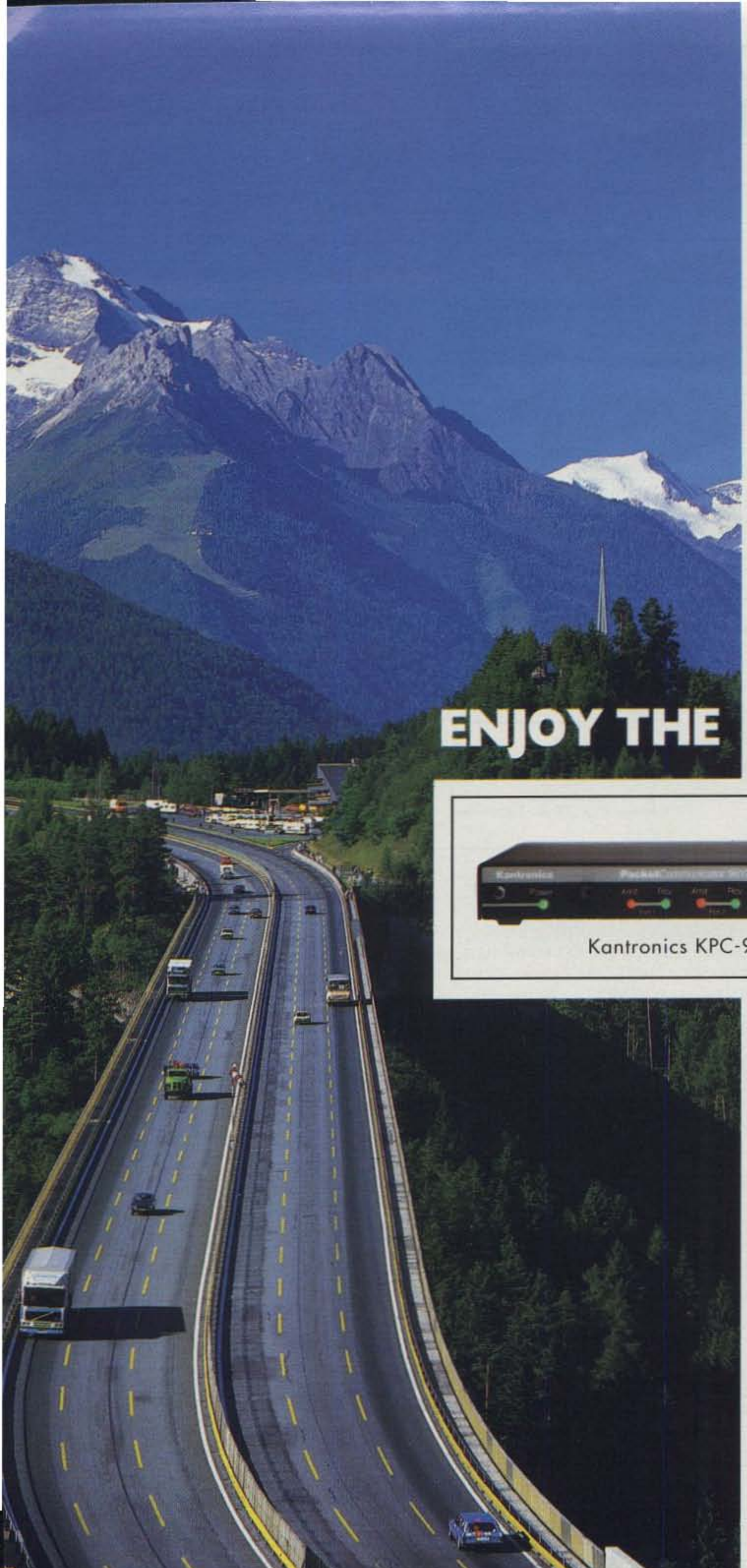

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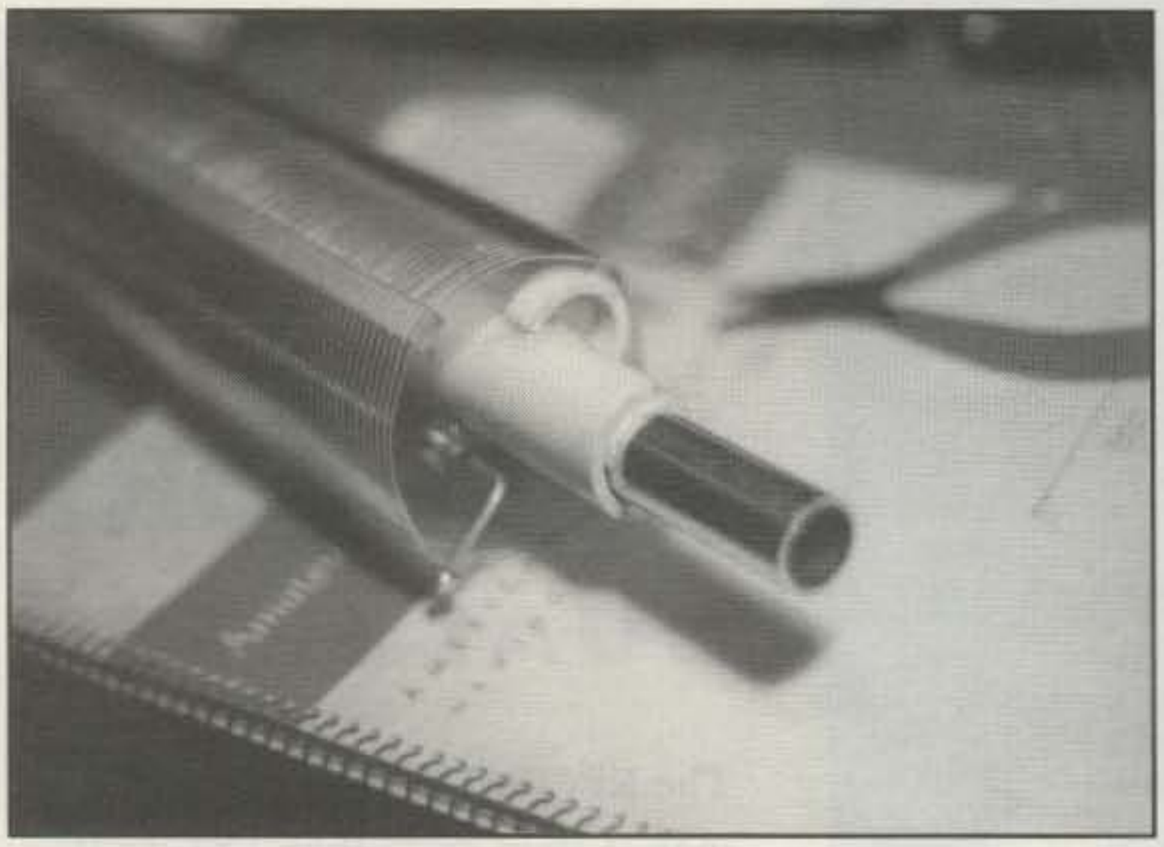
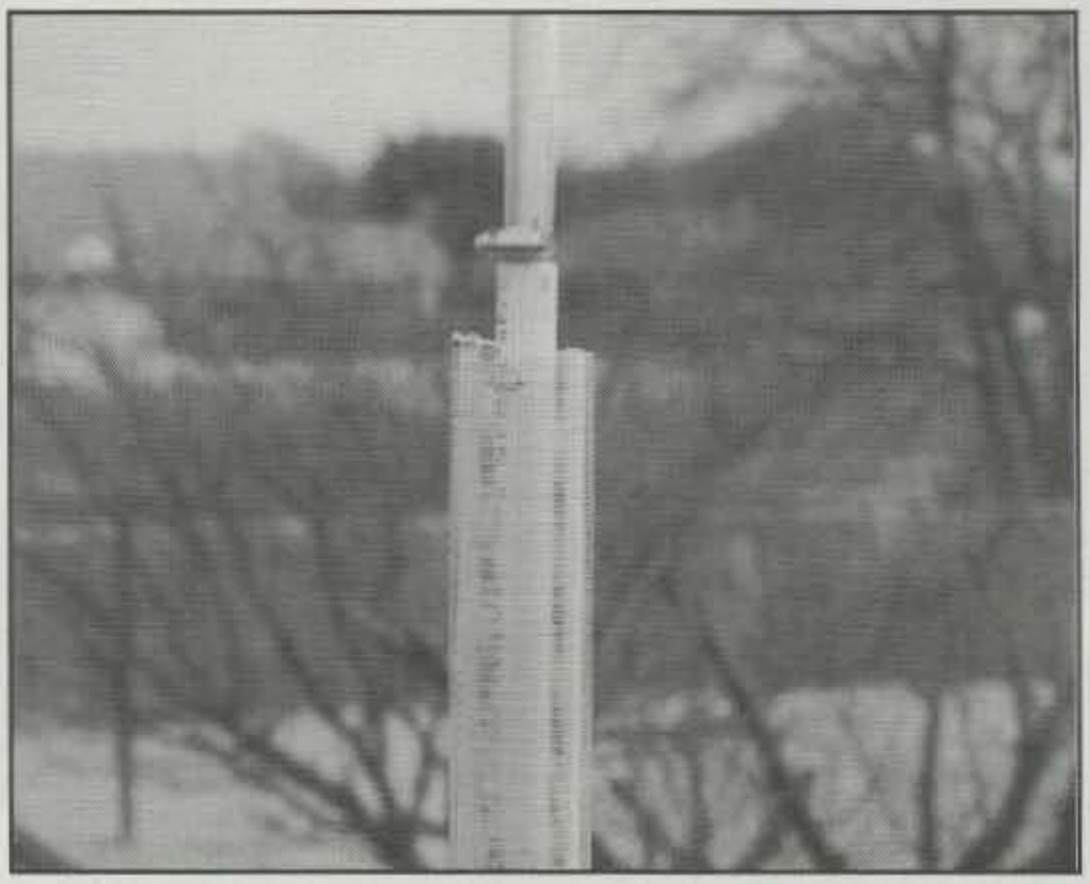


A close-up view of the 160 meter coil showing the coil support system. The brass rod holds the coil secure on one side and the small piece of PVC the other.



The 160 meter coil is shown installed on the antenna using stainless-steel hose clamps.

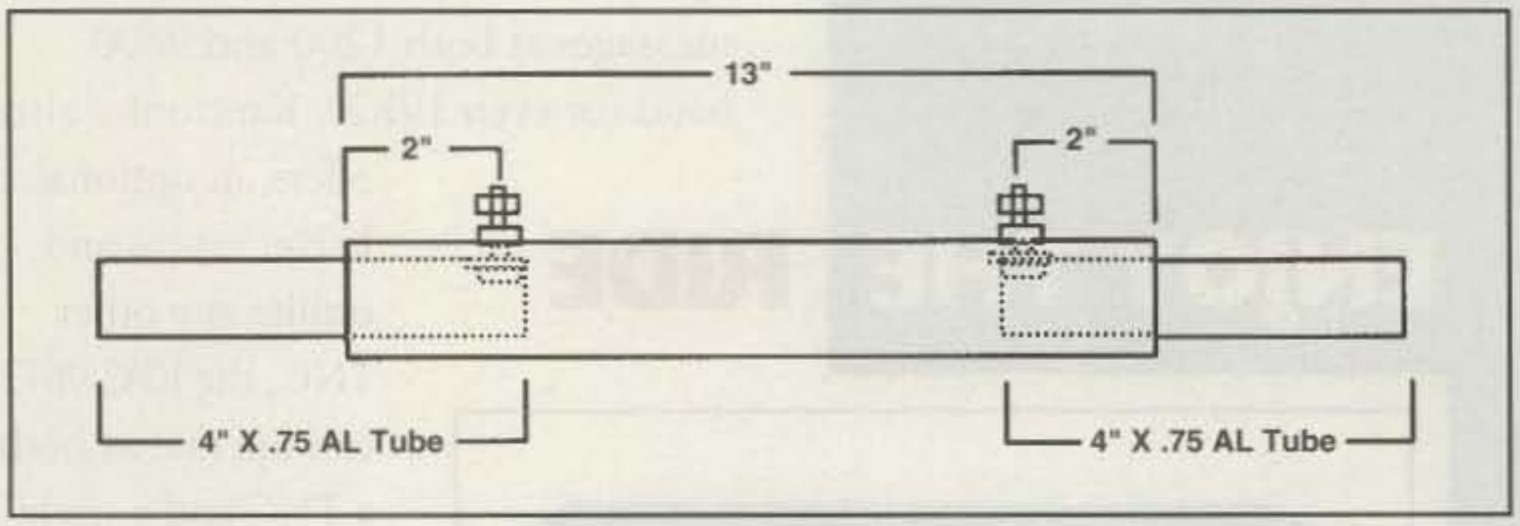


Fig. 6– Mechanics of the 160 meter coil assembly. The coil is not shown in this view.

This calculates out to only 1.3 ohms of radiation resistance for this antenna! Center loading will increase this to 3 ohms, which can help considerably with the antenna efficiency. As an example, assume you have a pretty good radial system consisting of 20 radials. This should give you about 10 ohms of ground loss. Now assuming that you can match perfectly to the total radiation resistance plus ground loss, let's see what improvements in efficiency can be achieved with center loading.

First remember that there will be loss in the loading coil. Because this is an air-wound coil with a fairly large diameter, a Q of 500 is assumed for the 140 µH center loading coil used in the final design. The loss of a coil is:

$$L_{loss} = 2\pi f L/Q$$

A center loading coil has twice the inductance of a base loading coil and so will have twice the loss for a constant Q. Finally, antenna efficiency in dB relative to a lossless antenna is:

$$Eff\ (dB) = 10 \log (R_{rad}/[R_{rad} + L_{loss} + R_{gnd}])$$

Refer to the following table for the results.

	R_{rad}	R_{gnd}	L_{loss}	Eff.
Base Loaded	1.3	10	1.5	–10 dB
Center Loaded	3.0	10	3.0	–7.3 dB

As you can see, center loading gives about a half S-unit improvement over base loading. For higher ground losses the difference becomes greater. For lower ground losses the difference becomes less. The lower you can reduce your ground losses (more radials) and coil losses (higher Q), the closer your antenna will be to "perfect."

I selected my center loading coil based on equations in the *ARRL Antenna Book* which indicated that a 130 µH coil mounted at the center of the antenna would resonate it on 160 meters. I used the equations for inductively loaded physically short antennas originaly derived by Jerry Hall, K1TD, and modified them for a center loaded vertical antenna as shown below:

$$X_L = (106/34\pi f)[[\ln 24((234/f - H/2)/D) - 1] [(1 - fH/468)^2 - 1]/(234/f - H/2) - 2[\ln(12H/D) - 1][(fH/468)^2 - 1]/H]$$

(Yes, this is simplified!)

where: f = frequency in MHz
H = vertical antenna height in feet
D = antenna diameter in inches

I used the average tubing diameter of 0.875 inches in calculating XL. The required inductance can now be found:

$$L = X_L/2\pi f$$

where: L = required coil inductance in microHenries
f = frequency in MHz

I found that a B&W 3031 coil (2½" diameter, 10 TPI, 10" long) has an inductance of 140

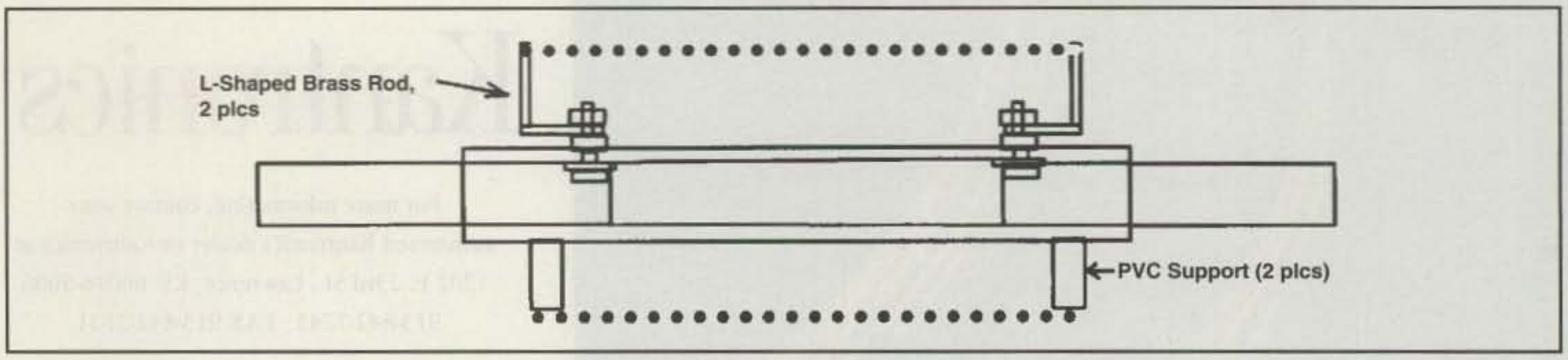


Fig. 7– A cutaway view of the 160 meter coil assembly showing the coil support system.

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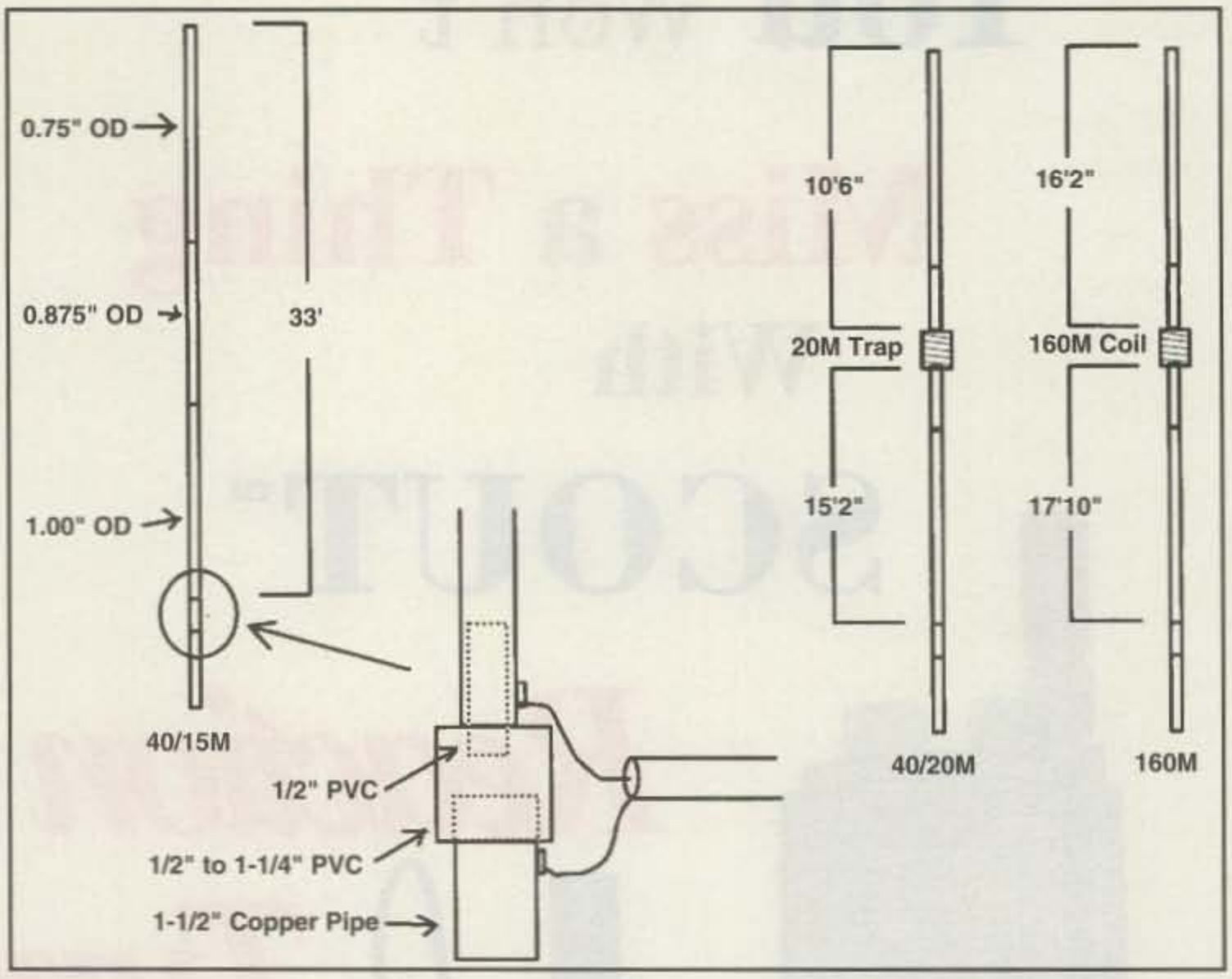

Fig. 8– A summary of antenna lengths for the three antennas.

The proof is in the pudding. Here at the base of the 160 meter center loaded vertical you can see the mica capacitor, and at the rear a portion of the RF choke described in the text. You will also note that the resonant frequency is 1.8168 MHz.

μH, so I ordered one from Surplus Sales of Nebraska for $19. To actually build the coil assembly, I used the same tricks I came up with for the 20 meter trap described earlier. The ¾" PVC insulating form length needs to be 13 inches long, and the entire B&W 3031 coil is used. Refer to figs. 6 and 7 and the photographs for the details. You should strengthen this PVC pipe, since it is not only longer than that used in the 20 meter trap, but there is a longer length of aluminum tubing above it than above the 20 meter trap. To strengthen the PVC pipe, assemble one of the 4 inch long aluminum tubes onto the PVC pipe, and then drop a 9 inch long ¾" diameter wood dowel that has been dipped in varnish into it. Then assemble the second 4 inch long piece of aluminum tubing onto the other end of the PVC pipe.

I used ⅛" diameter brass rod to both support and provide electrical contacts between the coil and the antenna as shown. One end of the brass rod is bent into a circle so that it can be mounted on the screws as shown. The remainder of the brass rod is bent into an L-shape as shown to support the coil. For the PVC coil supports that are shown opposite the bent brass rods, I cut a short piece of PVC pipe lengthwise as can be seen in the photograph. I attached the PVC support between the main PVC pipe and the coil with a spot of hot glue to hold it while a liberal amount of epoxy was curing. Again, this antenna consists of 12 foot telescoping lengths of 1" OD, 0.875" OD, and 0.75" OD aluminum tubing. The 0.875" OD section is cut exactly in half, and the coil is mounted at this point.

Well, we've resonated the antenna, but the antenna impedance (radiation resistance plus ground loss), while now totally resistive, is still lower than 50 ohms as described earlier. As most HF mobile operators know, a shunt capacitor at the antenna base can be found which will transform the impedance of short coil loaded antennas to 50 ohms. I found that 2500 pF of capacitance to ground at the base of this antenna transformed the impedance to close to 50 ohms. I realized this capacitance with a 1500 pF and a 1000 pF silver mica capacitor connected in parallel. These capacitors are rated at 1000 VDC. It is better if you can find higher voltage capacitors, especially if you run more than 100 watts and are using an antenna tuner to move much beyond the antenna resonant frequency. I resonated my antenna near the bottom of 160 meters since I operate CW there. My antenna resonated at 1817 kHz when the bottom of the coil was exactly 17'10" above the antenna base, and the tubing above the top of the coil was exactly 16'2". To raise the resonant frequency of the antenna, shorten the tubing above the coil. At resonance my SWR is 1.2:1. The 2:1 SWR bandwidth is only 10 kHz on this antenna! This implies that the antenna is pretty efficient—i.e., most of the driving impedance is transformed radiation resistance and not ground losses. A higher percentage of ground losses would broaden the bandwidth of the antenna but lower the efficiency. To wander much beyond your resonant frequency, you'll need an antenna tuner. Fig. 8 summarizes the antenna lengths for the three different antennas discussed (40/15, 40/20, and 160 meter).

More Bands?

You don't have to stop here. You can build a center loaded antenna for 80 meters that will outperform standard commercial base loaded short verticals as well. You can build a seperate 80 meter coil (25 μH required) or just short out turns on the 160 meter coil to reduce the inductance for 80 meters, although shorting turns may reduce the coil Q. Don't forget to change the shunt capacitor at the antenna base between 80 and 160 meters!

Conclusion

I have shown simple ways of building for yourself very effective antennas that can be used on several different bands (although usually one at a time). The total cost of the tubing for this antenna is around $30. The total cost of all the different traps was about another $30 (due to the cost of the 160 meter coil). Obviously, you can make this antenna work on many different bands with a few design changes. Go ahead and build an HF antenna. You'll have fun, learn a lot, and best of all you can use the final product on the air! ■

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handheld	B23G*	$169	2	30	20/0.8	3½x2x7
dual purpose	**B108***	**$229**	**10**	**80**	**20/0.8**	**8x3x5½**
handheld	B215G*	$379	2	150	20/0.8	12x3x5½
dual purpose	**B1016G***	**$379**	**10**	**160**	**20/0.8**	**12x3x5½**
mobile/base	B2516G*	$299	25	160	20/0.8	12x3x5½
mobile/base	**B5016G***	**$299**	**50**	**160**	**20/0.8**	**12x3x5½**
dual purpose	B1030G	$689	10	300	20/0.8	10x12x5
mobile/base	**B2530G**	**$689**	**25**	**300**	**20/0.8**	**10x12x5**
mobile/base	B5030G*	$669	50	300	20/0.8	10x12x5
dual purpose	**B1060G**	**$1094**	**10**	**600**	**20/0.8**	**10x12x5**
mobile/base	B2560G	$1094	25	600	20/0.8	10x12x5
mobile/base	**B5060G**	**$1094**	**50**	**600**	**20/0.8**	**10x12x5**

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mobile/base	D3010N*	$365	30	100	12x3x5½

Most popular 6 Meter amp

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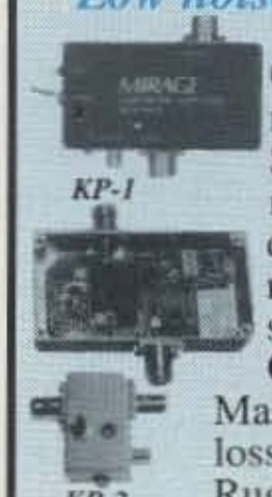
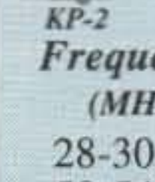

KP-1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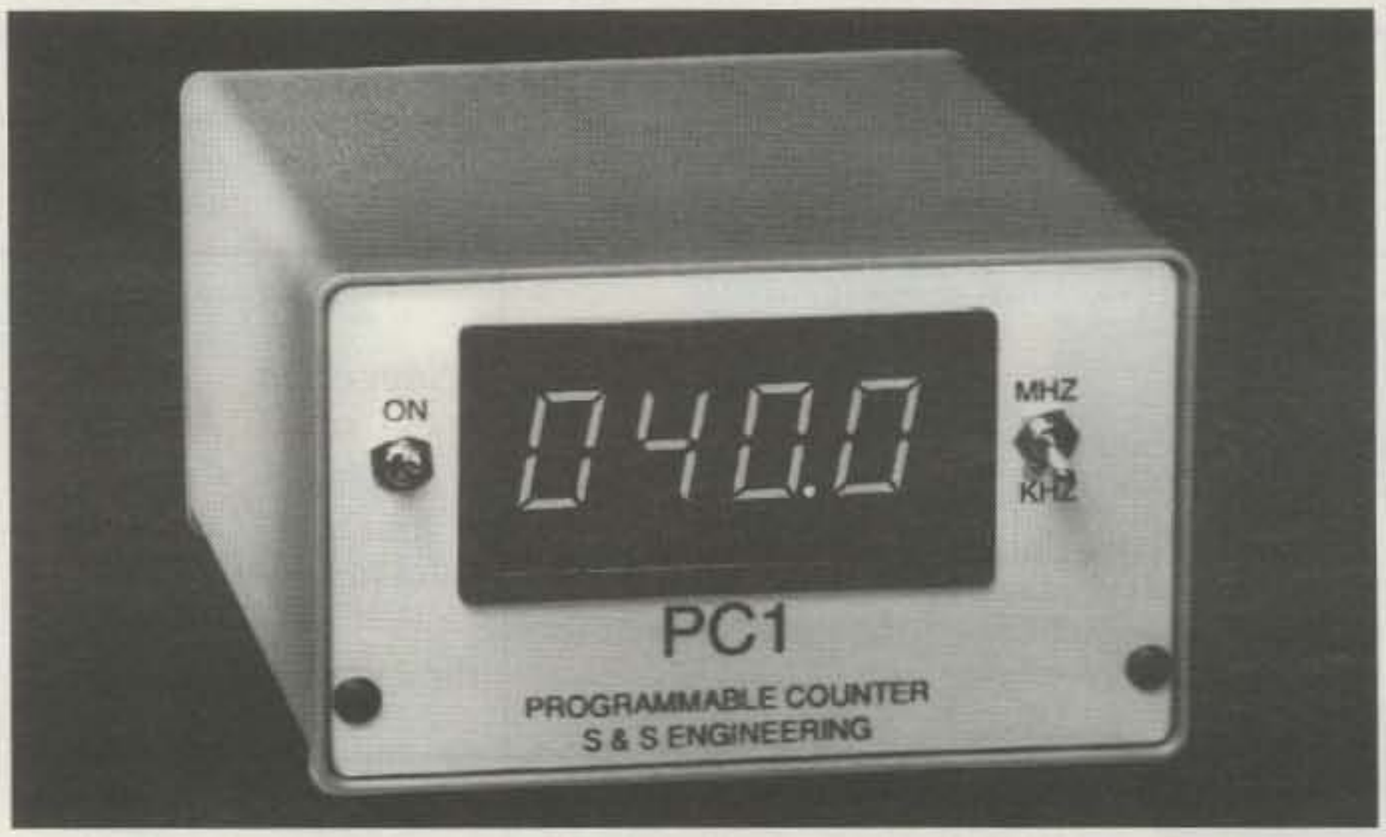
CIRCLE 164 ON READER SERVICE CARD

CQ REVIEWS:

S & S Engineering PC1 Programmable Counter

BY PAUL CARR*, N4PC

What makes our hobby great is the fact that there is something for everyone. Since the early days of my amateur radio career, I have enjoyed building my own equipment both for operating and test purposes. One thing that has always posed a problem is that it is extremely difficult to obtain an accurate frequency display for a receiver. The challenge is simple if the IF strip for a superhet receiver is at an even megaHertz, but this is the exception rather than the rule. Very often the IF is at some frequency that has no convenient way of allowing the VFO frequency to be read and mentally translated to an operating frequency. To make matters even worse, the receiver can "tune backwards." For example, as the VFO frequency increases, the receive frequency decreases. What is necessary to solve this problem is a programmable counter.



The S & S Engineering PC1 programmable frequency counter.

What Is A Programmable Counter?

Laboratory frequency counters have common characteristics. When the counter has no input, the display reads zero. If you apply a test signal to the input, it will cause the display to indicate the frequency. If the signal increases or decreases, the display will track up or down accordingly. This is exactly what we need for general frequency measurements.

Programmable frequency counters will also perform this function if the display offset is set to zero and the unit is placed in an "up count" configuration. However, programmable counters can also be set so that the initial display reading is non-zero. This feature can compensate for an IF frequency that is not an integral multiple of a megaHertz. This takes care of the IF offset problem.

The second feature of the programmable counter is that the display can be made to decrease as the frequency increases. This feature allows a direct readout in case the receiver decreases as the VFO frequency increases. This allows a direct readout even if the receiver "tunes backwards." The PC1 will do all these functions.

A Word About S & S Engineering Kits

This is the third kit from S & S Engineering that I have had the pleasure to build. In all the kits top-quality components and circuit boards are provided. The instruction book is very well written and provides excellent detail on the construction and programming of the unit. Parts placement is very logical, and never do you find yourself in an awkward situation for placing or soldering parts.

*97 West Point Road, Jacksonville, AL 36265

Before You Begin Construction

Plan to spend time familiarizing yourself with the instruction booklet. It is also a good idea to inventory the components and identify each as to type. I use small containers to separate the parts according to type. This makes it easier to choose the correct part quickly during the construction phase. If you are comfortable with the instruction booklet, you are ready to begin construction.

The Construction Phase

Place parts according to the instruction manual. Begin with the small parts and go on to the larger parts. Proper parts placement is aided by the component outlines that are silk screened on the circuit board. Be sure to observe the polarity markings on the parts as necessary. Double check all parts for proper placement before soldering. Check your work frequently for solder bridges and make any corrections as necessary. Do not try to work too long without taking a break, for to do so is to invite wiring errors. The length of time necessary for construction depends on your experience level, but the kit is not beyond the capabilities of the beginner.

Calibration and Testing

The calibration and testing procedure is very straightforward. After you have verified that there are no shorts in the voltage supply circuit, apply power. The display should light. The most critical part of calibration is to set the crystal oscillator to exactly 4096.000 kiloHertz. This is most easily accomplished with the aid of a frequency counter. If you do not have a counter, try to find a friend who will help you. (This is a good argument for belonging to a club.)

Next, verify that the small binary switches are working properly. One of the switches controls the up/down count function. Another switch is provided to allow suppression of leading zeros, if you desire this feature. The remainder of the switches allow proper offset to compensate for IF offset. All of these tests are accomplished by using the internal crystal oscillator as a signal source, so the only extra test equipment needed is a VOM and a frequency counter. The entire procedure is very simple and clearly outlined in the instruction booklet.

The unit works flawlessly. I made a slight modification to my Argonaut 515, and I picked up the mixer injection signal from the VFO circuit. With the PC1 set to the kiloHertz position, I can read the frequency on the band that I am operating correct to the nearest tenth of a kiloHertz. I think the PC1 has found a permanent home on top of the Argonaut!

Availability

The PC1 is available from S & S Engineering, 14102 Brown Road, Smithburg, MD 21783 (301-416-0661). The basic kit is $69.95. The basic kit with the cabinet is $99.95. It is also available wired and tested with the cabinet for $139.95 (shipping and handling is extra). ■

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Work signals the competition can't even hear. Low phase noise makes it possible.

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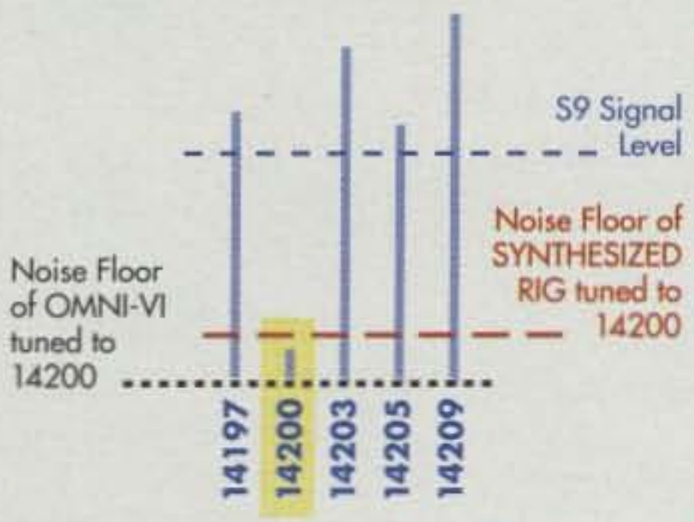
Let's compare the OMNI-VI to any competitor's synthesized rig with both tuned to the same frequency.

5 Typical Signals on a Crowded Band



Noise floor doesn't change in the presence of nearby strong signals. Work the weak one at 14200 just over the noise.

Noise floor increased in presence of nearby strong signals. Can't even hear weak signal at 14200.

Phase noise causes the noise floor to *temporarily* increase covering weak signals *inside* your passband especially when strong signals *outside* your passband are within a few KHz of where you'd like to listen.

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OMNI-VI is the only modern high performance amateur transceiver to use crystal mixing—chosen over a synthesizer because it provides the very best phase noise performance of any technology. Phase noise is essentially eliminated as a factor in receiver performance. Treat yourself to the best on HF.

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CQ REVIEWS:

The Cushcraft ASL 2010 Log-Periodic Antenna

BY PAUL CARR*, N4PC

Well, spring vacation finally came, and it was a welcome relief from my classroom duties. I had been looking forward to this break because it would give me a chance to assemble and build a new antenna. Waiting in my garage was the new Cushcraft ASL 2010 log-periodic system. Since then I have had time to evaluate the system. Here are the results of that evaluation.

What Is A Log-Periodic Antenna?

A log-periodic antenna is a frequency-independent antenna system. These antennas are capable of bandwidths that were impossible a few years ago. This particular system has a 2:1 bandwidth of better than two octaves. This is accomplished by the choice of element length, spacing, and phasing. (All of the elements are fed simultaneously.) The element lengths vary from slightly greater than a half-wave length at the lowest frequency to just less than a half-wave length at the highest frequency. The resulting gain is about constant, and the nominal impedance is about 200 ohms. By using a 4:1 balun an impedance of approximately 50 ohms results. Now for a few specifics about Cushcraft's design.

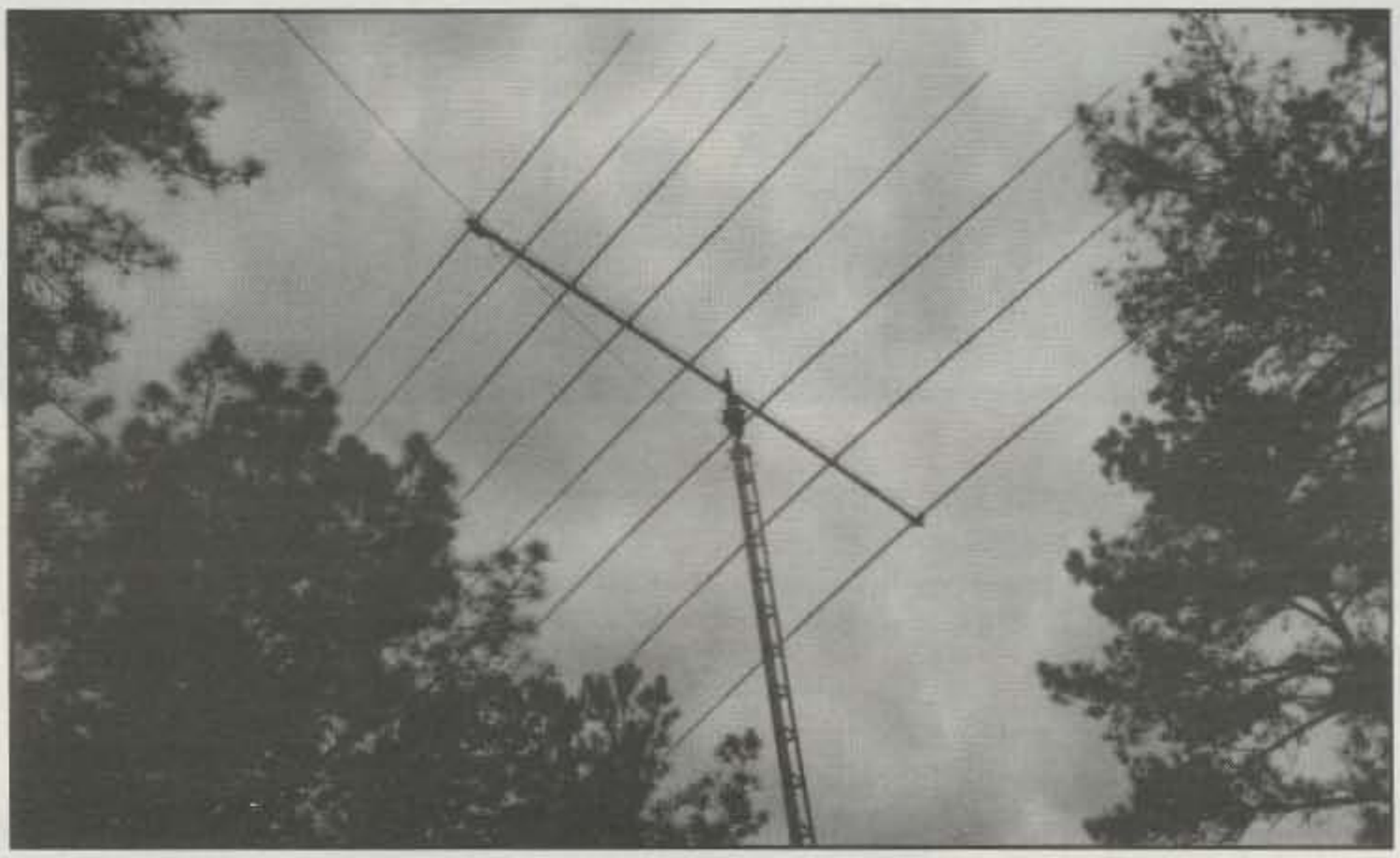
The ASL 2010

The ASL 2010 is a new product from Cushcraft, and it covers 20, 17, 15, 12, and 10 meters. The antenna consists of eight elements in a log-periodic dipole array. The antenna is fed through a single 50 ohm coaxial cable to a 4:1 balun matching unit (mounted on the boom). The beam is rated at 2000 watts.

The electrical 2:1 bandwidth of the antenna as specified by Cushcraft is from 13.5 MHz to 32 MHz. As I indicated earlier, this is a property of the log-periodic design. I used an MFJ 259 to make SWR measurements across the spectrum and on each of the amateur bands. Never did the SWR exceed 2:1 across the spectrum. The most variation in SWR occurred on 20 meters. The maximum SWR of 1.7:1 was at 14.0 MHz, and the minimum of 1.3:1 was at 14.25 MHz. The SWR results on 10 meters were amazingly flat, never exceeding 1.4:1 across the entire band (see fig. 1).

The published gain figure for the antenna is 6.4 dBd. It is extremely difficult to verify gain figures without a calibrated antenna range, but comparing the results I received with other antennas, I feel the gain figure is about right. The rated front-to-back ratio is stated to be 15– 20 dB. I found no place throughout the spectrum where I felt this information was inaccurate.

*97 West Point Road, Jacksonville, AL 36265



The completed antenna ready to take on the world. Is anyone listening?

Mechanically, the specifications for the beam are a boom length of 18 feet, with a boom diameter of 2 inches. The longest element is 38 feet, and the turning radius is 19.25 feet. The beam accepts a mast diameter of 1.5–2 inches, and the total weight is 55 pounds. The wind loading 10.1 square feet. All the hardware is of the highest quality stainless steel, which we have come to expect from Cushcraft.

Assembly

As you can see from the picture, the antenna

As you can see, there are enough parts here to keep you busy for at least a day. Please note that the flower pots are not included.

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The SCOUT is the most economical way to get started in ham radio. Consider the choice a new ham must make just to test his interest in HF: (1) Spend nearly $1000 or more on a new rig, (2) buy a used radio and take a chance on its condition, or (3) invest in a SCOUT at $549 with a one year factory warranty and our legendary TEN-TEC support.

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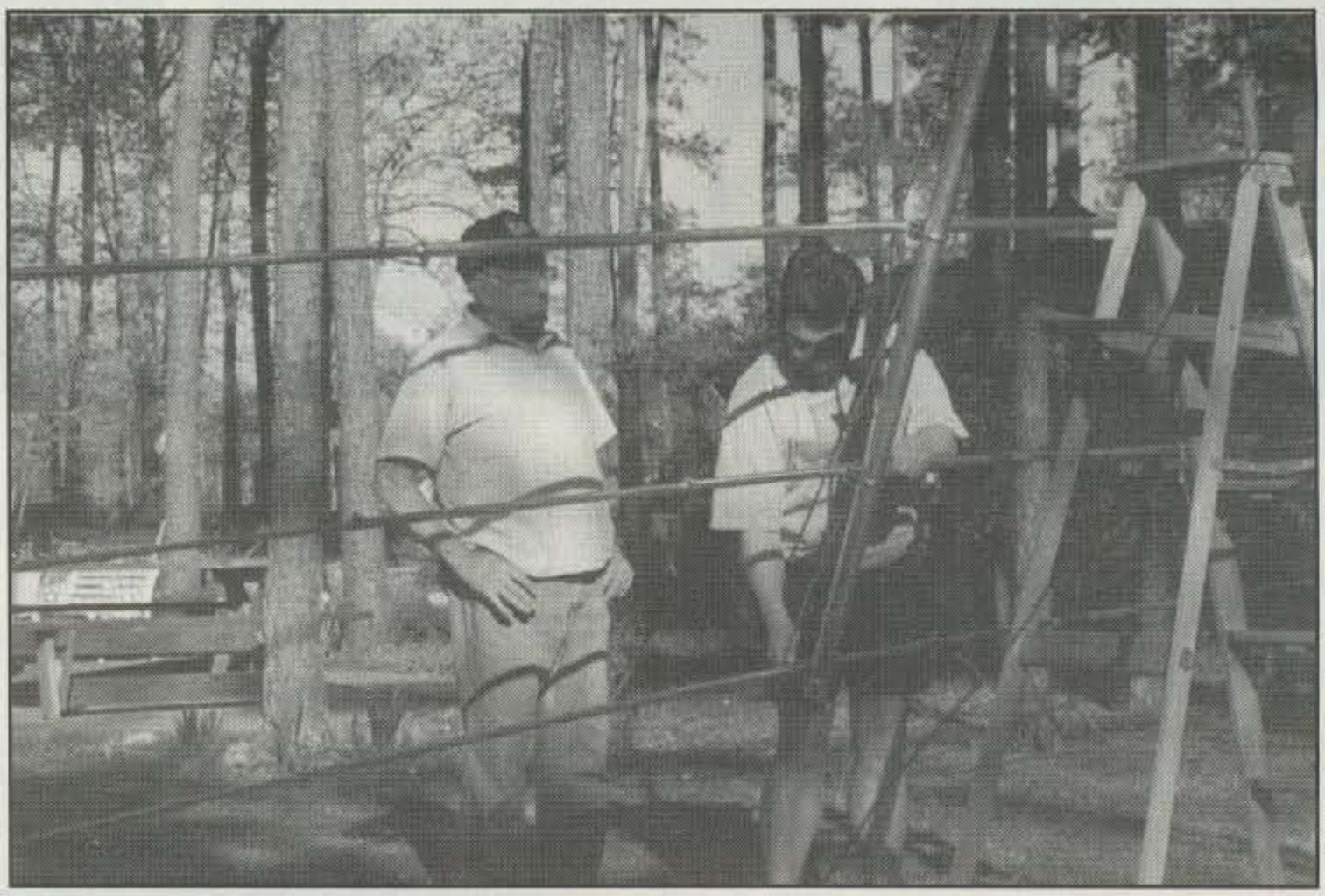
has a very high parts count. Your success depends on your ability to do an accurate inventory of the parts and organize the parts for easy accessibility during the construction phase. If you are working alone during the initial construction phase, allow about one day to assemble the elements and the boom.

There are seven steps listed in the instruction manual. Assemble the boom first. This will give you practice working with hand tools and will let you become used to the way the instructions are written. The boom is in three sections, with the end sections made so they will slip into the center section for a predetermined length and then stop. All that is necessary is to place two locking screws and tighten the compression hose clamps. Place the plastic end covers, and you are finished.

The element construction is next. Begin with the longest element. Carefully measure the overlap specified on the diagram. The total element length is dependent on the proper measurement and assembly of the elements. Continue the element construction as specified in the instruction sheet. Verify the element lengths at least twice.

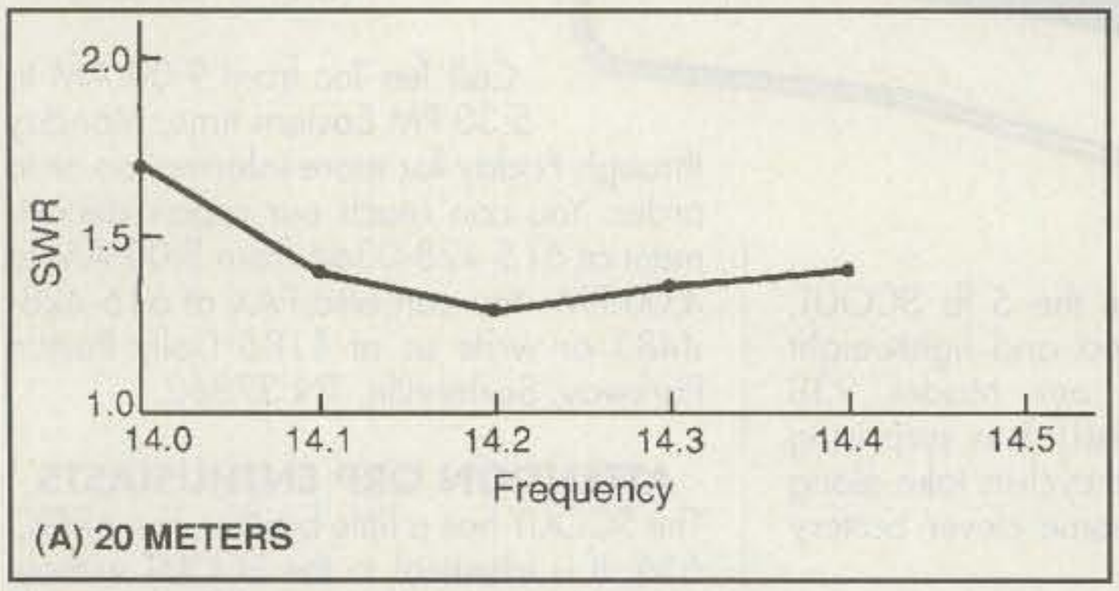
Now you have a decision to make. If you intend to fully assemble the antenna before you place it on the mast, follow the instructions in the booklet. I have a crank-down/tilt-over tower, and I chose to depart from the instructions. Following is how to accomplish the installation.

Carefully measure and mark the location of each element and the boom-to-mast bracket. Next mount the boom-to-mast bracket. Then move all the assembly components to the mast location. Turn the antenna rotor so that it will display the proper direction when the tower is tilted to allow installation. Mount the boom to the mast, verify all the steps, and tighten the mounting hardware.

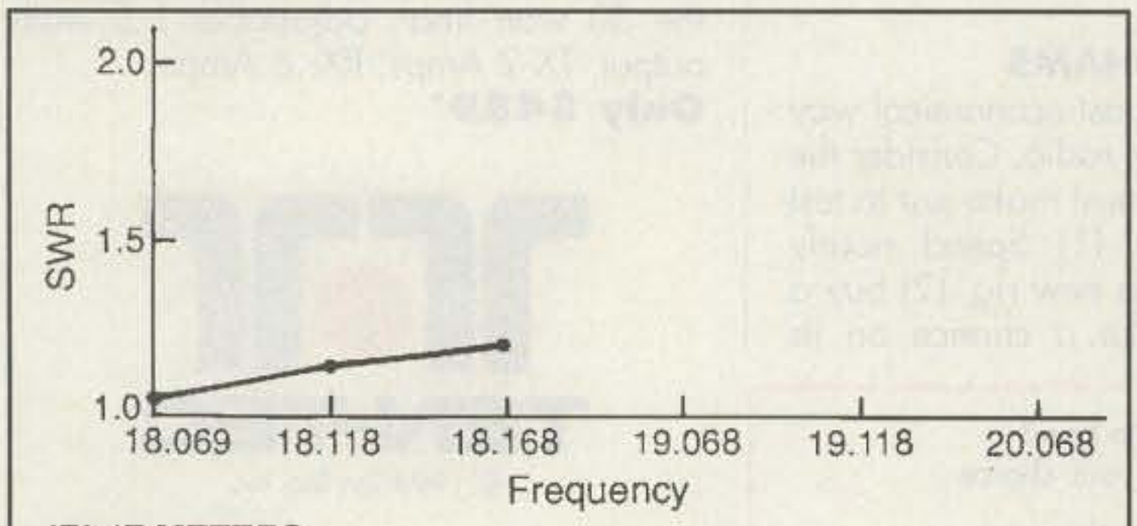


Things will go easier and faster if you can coerce some friends into helping you out. Here Ralph, KE4UAK, puts the finishing touches on some connections, while Harold, W4ZS, supervises the handiwork.

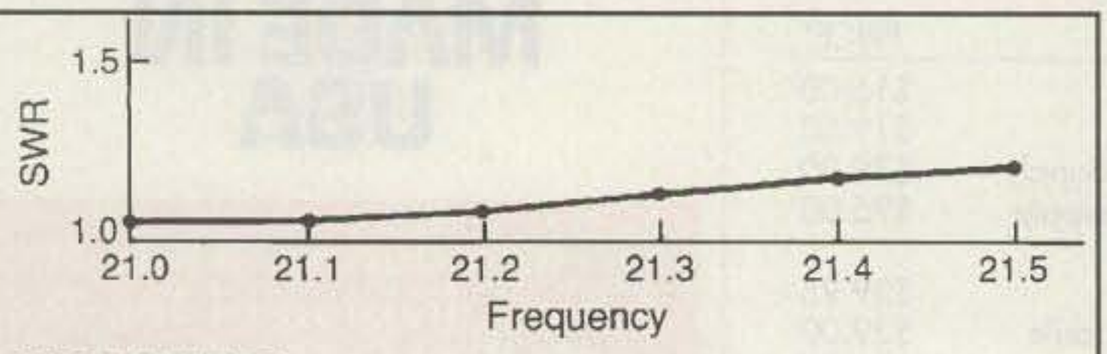
Mount the longest element, and check for proper alignment. Follow by placing the next two longest elements. After you are satisfied that the elements are in the proper position, place the phasing straps in accordance with



(A) 20 METERS

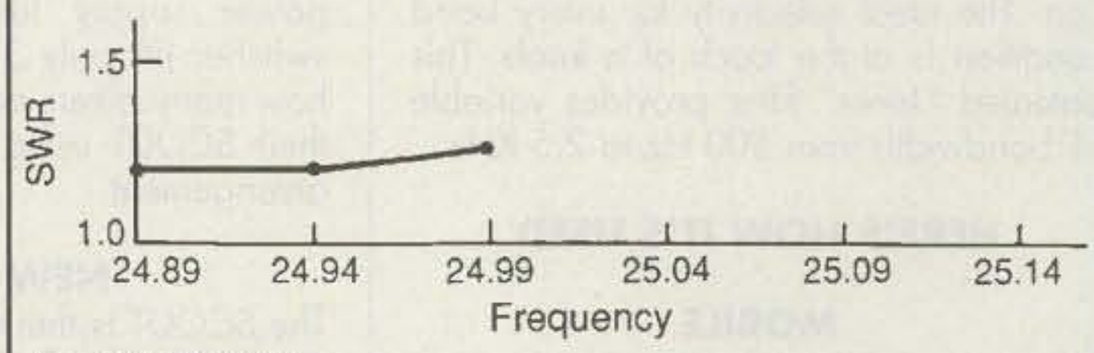


(B) 17 METERS

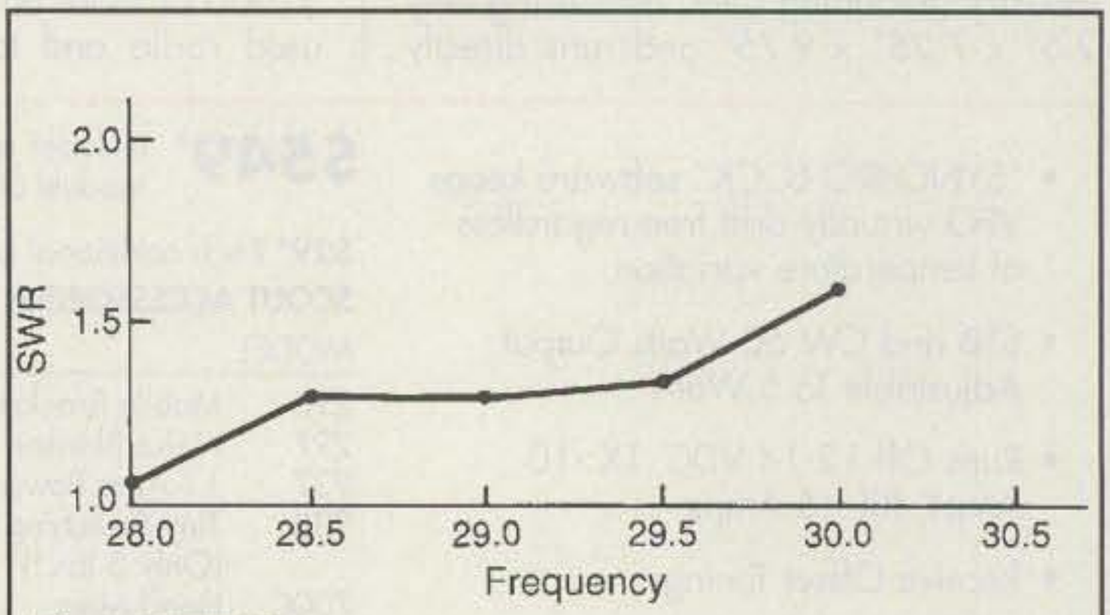


(C) 15 METERS

Fig. 1– These are the SWR curves for each band as I derived them from my QTH.



(D) 12 METERS



(E) 10 METERS

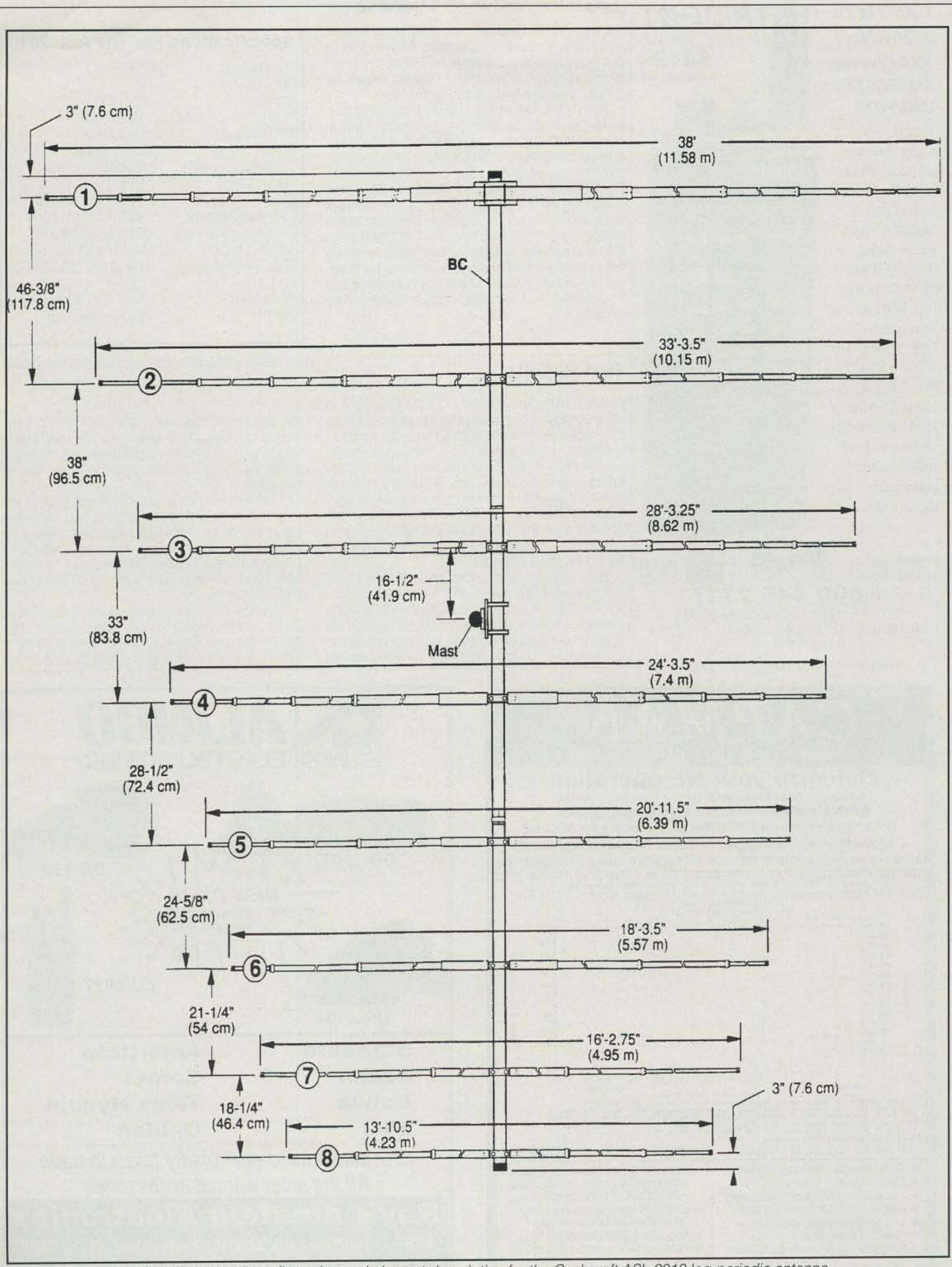


Fig. 2– The overall configuration and element description for the Cushcraft ASL 2010 log-periodic antenna.

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the instruction booklet. You now should have three elements in place, and phasing lines between two of the elements. Raise the mast to the vertical position and visually check for proper element-to-boom alignment.

Rotate the assembly 180 degrees, and lower the antenna so that the assembly can be completed. Continue by placing the elements and phasing lines in a longest to shortest pattern until the antenna is completely assembled. Recheck all hardware and elements. Mount the matching network and connect the network output to the antenna. Connect the coax to the matching network (be sure to leave a drip loop) and route the coax to the shack. Raise the antenna to its vertical position and check for proper element alignment. Make any corrections as necessary. You are now ready for preliminary tests.

Specifications For The ASL 2010

Frequency	13.5–32 MHz
No. of elements	8
Forward gain	6.4 dBd
Front-to-back ratio	15–20 dB
2:1 Bandwidth	18.5 MHz
Power rating	2000 watts
3 dB Beam width	65 deg. E plane
Boom length	18 ft. (5.48 m)
Boom diameter	2.0 in. (5.08 cm)
Longest element	38 ft. (11.58 m)
Element center dia.	1.25 in. (3.18 cm)
Turning radius	19.25 ft. (5.86 m)
Mast size range	1.5–2 in. (3.18–5.08 cm)
Wind load	10.1 ft.^{2} (.93 m^2)
Weight	55 lb. (25.5 kg)

Table I– ASL 2010 antenna specifications.

Test Results

I have made many tests on all the bands, and although band conditions have been less than desirable, I am well pleased with all results I received. I feel the antenna performs great, and a plus is the fact that you have instant band-change capabilities. This is a definite benefit if you are interested in multi-band contests such as the CQ World-Wide. For an all-around antenna with good performance and maximum flexibility, I feel that this antenna would be hard to beat.

I would like to add a word about the mechanical stability of the beam. In my part of the country we do not experience great straight-line winds that are seen other places; however, we do experience tremendous rotating winds associated with thunderstorms. I have observed the antenna under such conditions, and I am happy to report that the antenna handled these winds with no problems. If I were describing a sailboat, I would report that she rides well in the water.

If I may insert an aesthetic observation, I am a mathematician by profession, and I find the geometry to be especially pleasing. My XYL shares my opinion. She remarked that she thought it was the prettiest antenna I had ever had, and she has seen plenty of antennas through the years!

The ASL 2010 is manufactured by Cushcraft Corp., 48 Perimeter Road, Manchester, NH 03108 (phone 603-627-7877; FAX 603-627-1764). The retail price of the ASL 2010 is $800.

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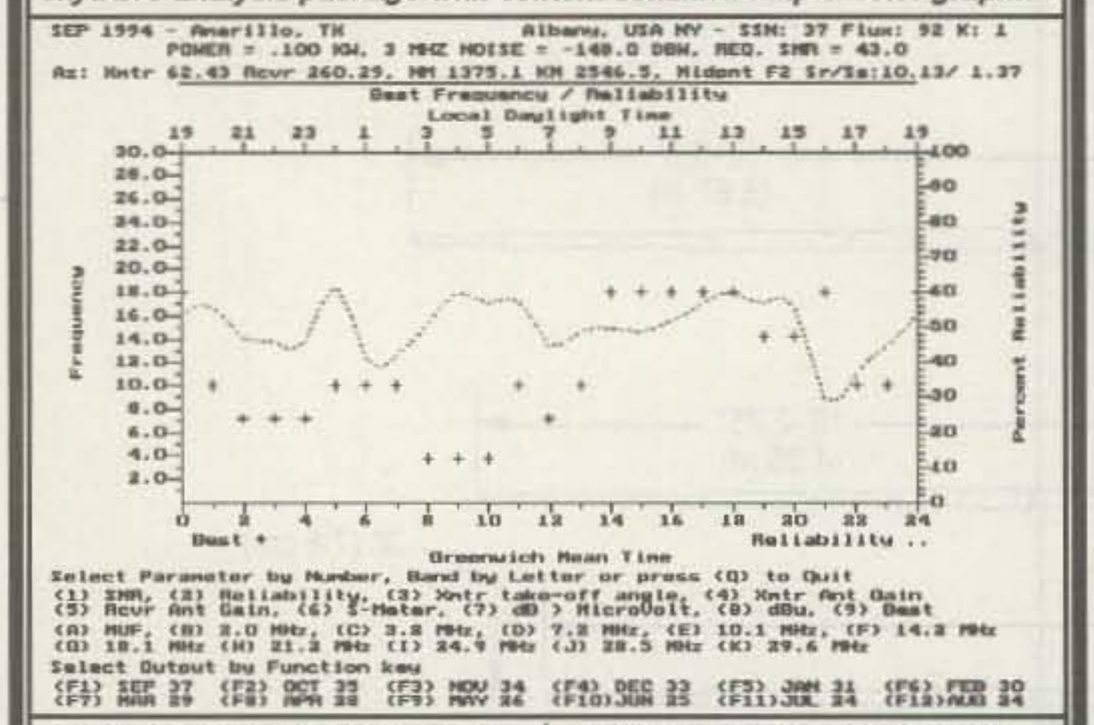

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SL-11R	•	•	7	11	2⅝ × 7 × 9¾	12
SL-11S	•	•	7	11	2⅝ × 7⅝ × 9¾	12
SL-11R-RA		•	7	11	4¾ × 7 × 9¾	13

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MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-4L	3	4	3½ × 6⅛ × 7¼	6
RS-5L	4	5	3½ × 6⅛ × 7¼	7

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MODEL RM-35M

- 19" RACK MOUNT POWER SUPPLIES

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

RS-A SERIES

MODEL RS-7A

MODEL	Colors Gray	Colors Black	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A		•	2.5	3	3 × 4¾ × 5¾	4
RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46
RS-70A	•		57	70	6 × 13¾ × 12⅛	48

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46
RS-70M	57	70	6 × 13¾ × 12⅛	48

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MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

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RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18
SL-11S	•	•	7	11	2¾ x 7⅝ x 9¾	12

If you have the room and the wire, here's an antenna that will give you many hours of fun ragchewing.

A 75 and 40 Meter Horizontal Loop Antenna

BY SIDNEY REXFORD*, W2TBZ

This antenna isn't for everybody. It requires a little more real estate than is available at every hamshack. However, if you have the room, it is a work horse capable of doing a real job for the ragchewer and those who need to get into traffic nets.

At best, antennas for any specific purpose will be a compromise, and this one is loaded with compromises. To begin with, the location at this station is undesirable, being about 250 feet from the shack and through the lawn and some brush area. The powers that be (the XYL) made it clear that there were too many wires in the backyard already. That meant an unobtrusive transmission line—coax feed, in this case a roll of 1/2 inch, 75 ohm TV hardline, the aluminum sheathed stuff the TV cable people use for their distribution system. It was on hand and free. For a single-band antenna this does not present much of a problem, but for an antenna that I desired to be resonant on both the 40 and 75 meter phone bands, the problem got stickier.

The best bet for the job appeared to be a horizontal quad loop. Horizontal loops have been described as "Cloud Warmers" and high-angle radiators. While the stigma is relatively true, it is the precise answer to the needs of a large portion of the amateur population. While I don't recommend horizontal loops to be used on bands higher than 40 meters, on the lower frequencies such as 160, 80, and 40 meters they perform as well as the "garden variety" dipole or inverted V for working DX, and outperform them on the short haul. Quads, both horizontal and vertical, have proven to be excellent performers in the past. I recommend them without any reservation.

Using the standard formula for quads (1005 divided by the frequency in MHz), a loop was cut for about 3.850 MHz, or 65 feet on a side. Because the most convenient feed point was in the middle of the west side, a 4:1 garden-variety balun was installed at this point. This will probably raise a few eyebrows, because the anticipated impedance of a loop usually is expected to be in the neighborhood of 120 ohms, and a 4:1 balun would present an output impedance from the loop of roughly 30 ohms.

I determined that a quarter-wave section of 50 ohm coax from the 4:1 balun at the antenna to the TV hardline should give a ball-park match to the 75 ohm hardline. Checking with the antenna scope, I got a reading of 68 ohms at the end of the 50 ohm quarter-wave section—a satisfactory match, and one which should give about a 1:1.1 SWR at the design frequency of 3.850 MHz into the hardline.

This pretty well took care of the 75 meter operation of the loop. More on the general pattern expected later.

Now for the 40 meter operation of the loop. The grid dip meter now indicated a resonant frequency of about 7.6 MHz, somewhat removed from the desired resonant frequency of 7.2 MHz. From here an explanation of what happens to make the loop resonant on the 40 meter phone band without actually making the loop longer is in order.

To begin with, suppose we do actually make the loop longer by adding enough wire in the form of equal hairpin-shaped loops at each of the insulators (the anticipated 40 meter high-voltage points) to bring the loop into resonance at 7200 MHz. These hairpin loops should hang down from the corners of the loop. Remember, we are trying to keep the original dimensions of the loop as computed for 3.85 MHz from insulator to insulator. The entire loop now looks like fig. 1, and a half wave exists from the bottom of one hairpin to the bottom of the next hairpin. Close inspection of the voltage and phase relationships on both sides of the hairpin loops will show that the phase and voltages on both sides of these loops are identical. In all my electrical engineering classes I was always taught that adjacent points having the same phase and voltage relationship could be connected together. Antennas are no exception. Since both sides of the hairpin loops are identical, their entire lengths can be welded together into one single conductor which will be common to each adjacent half-wave section as we go around the entire loop.

A single piece of wire 3 feet long, dropped and left dangling, at each of the four points brought the 40 meter resonant point down to 7.2 MHz. This made no detectable difference in the 75 meter resonant frequency, since the

* 62 East Higley Rd., Colton, NY 13625

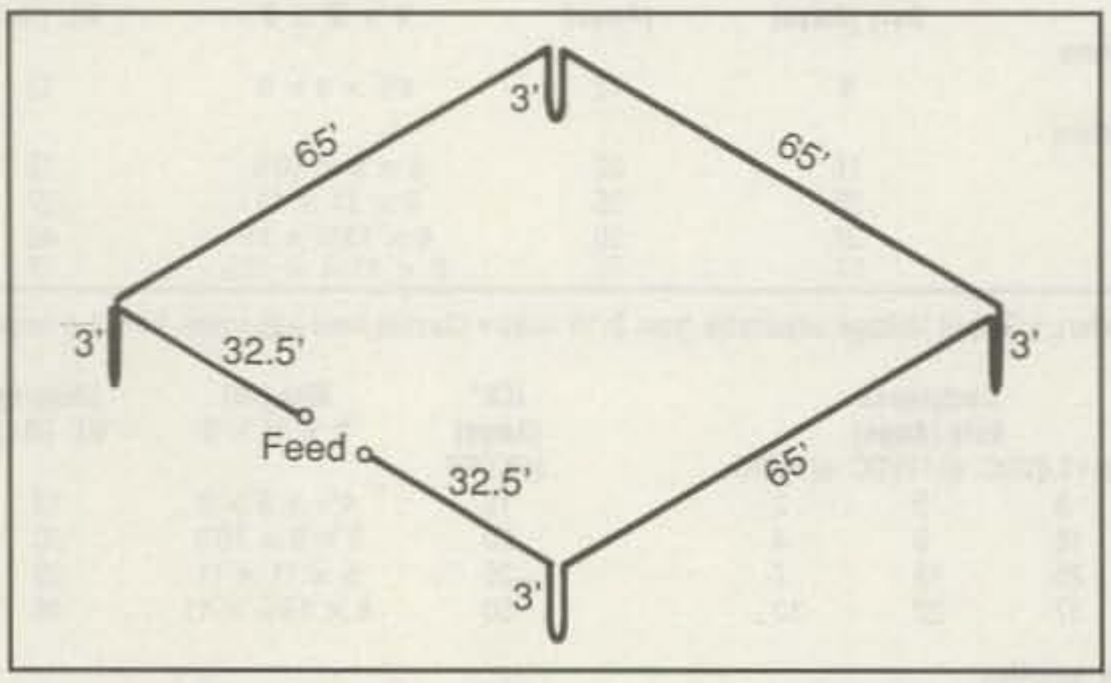

Fig. 1– Basic configuration of a two-band loop.

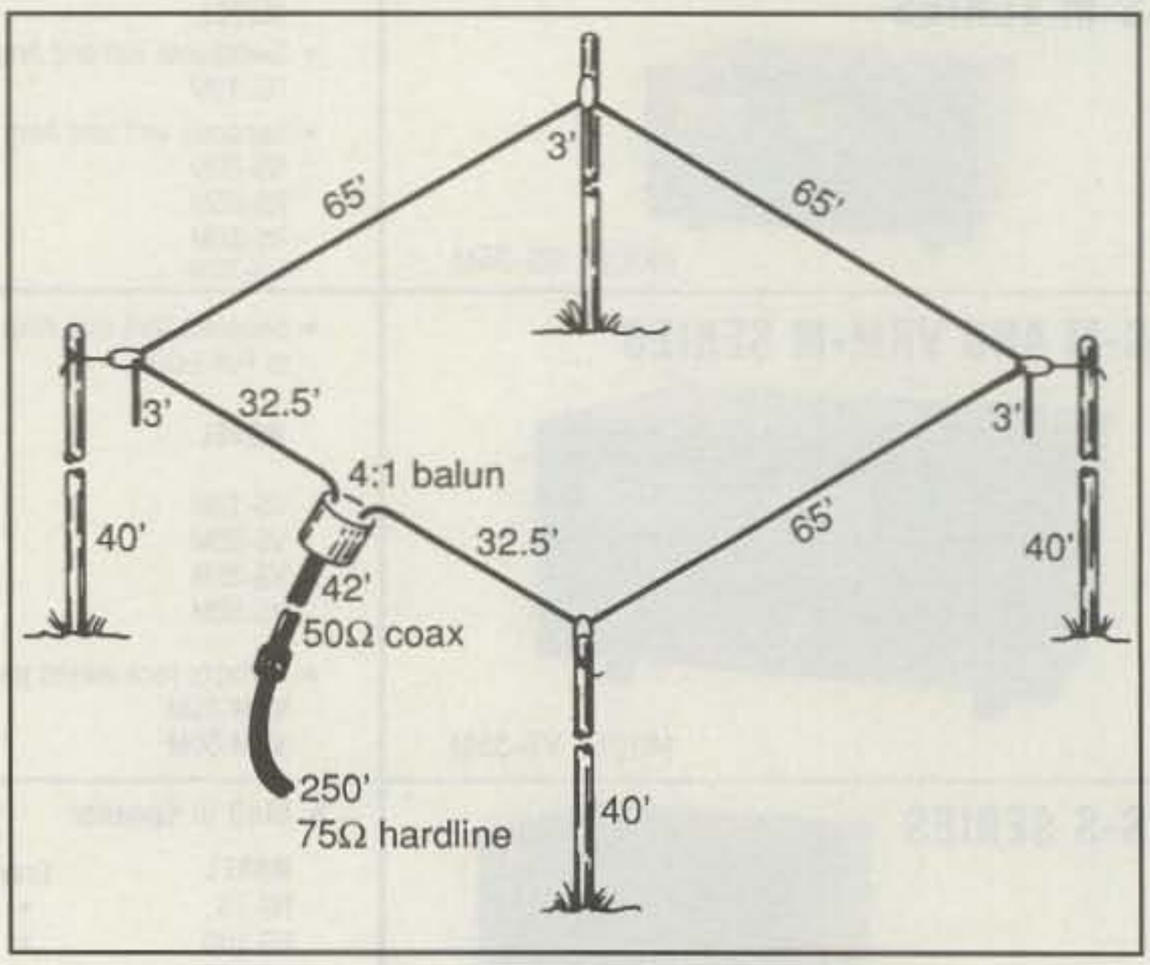

Fig. 2– Dimensions for the two-band loop described in the text.

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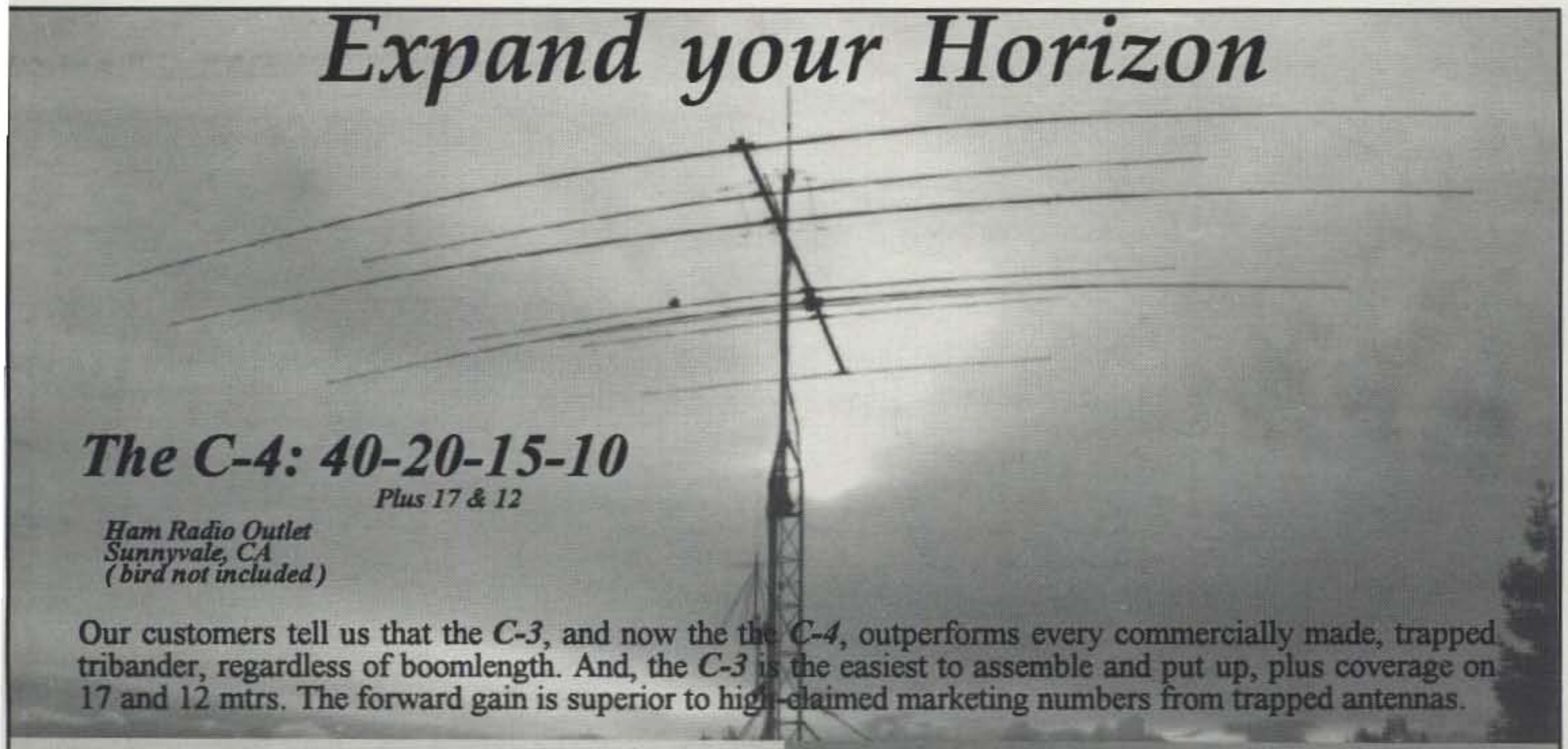

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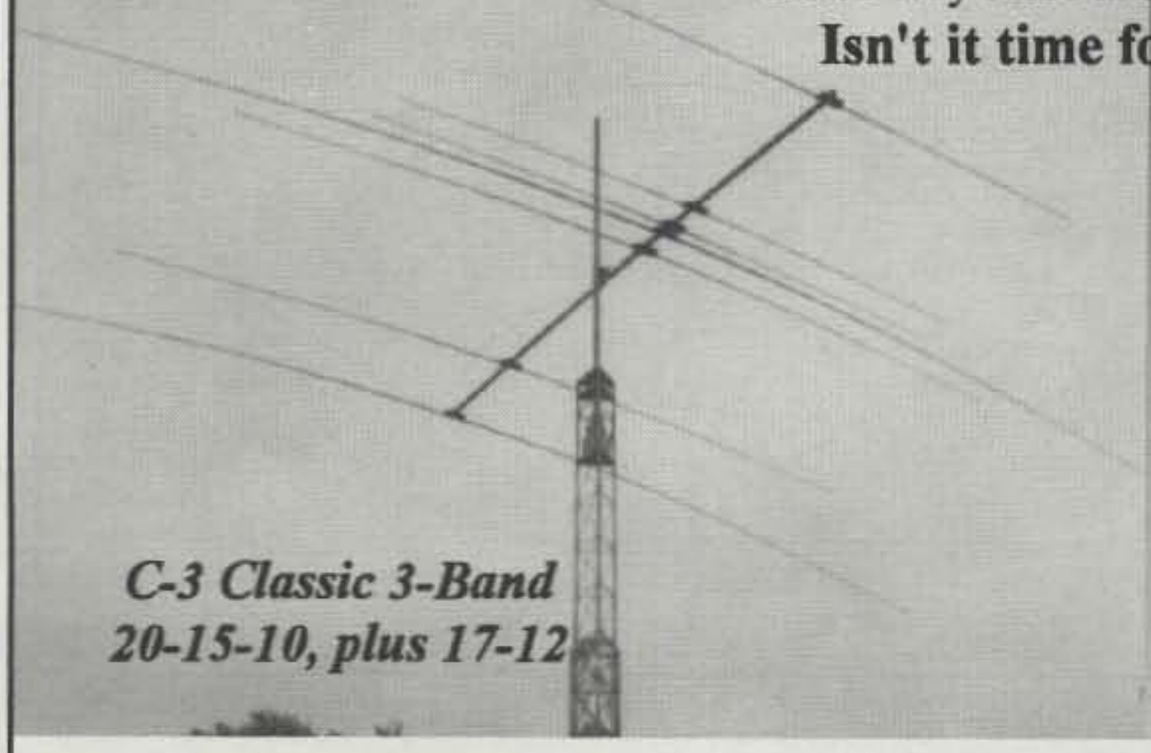

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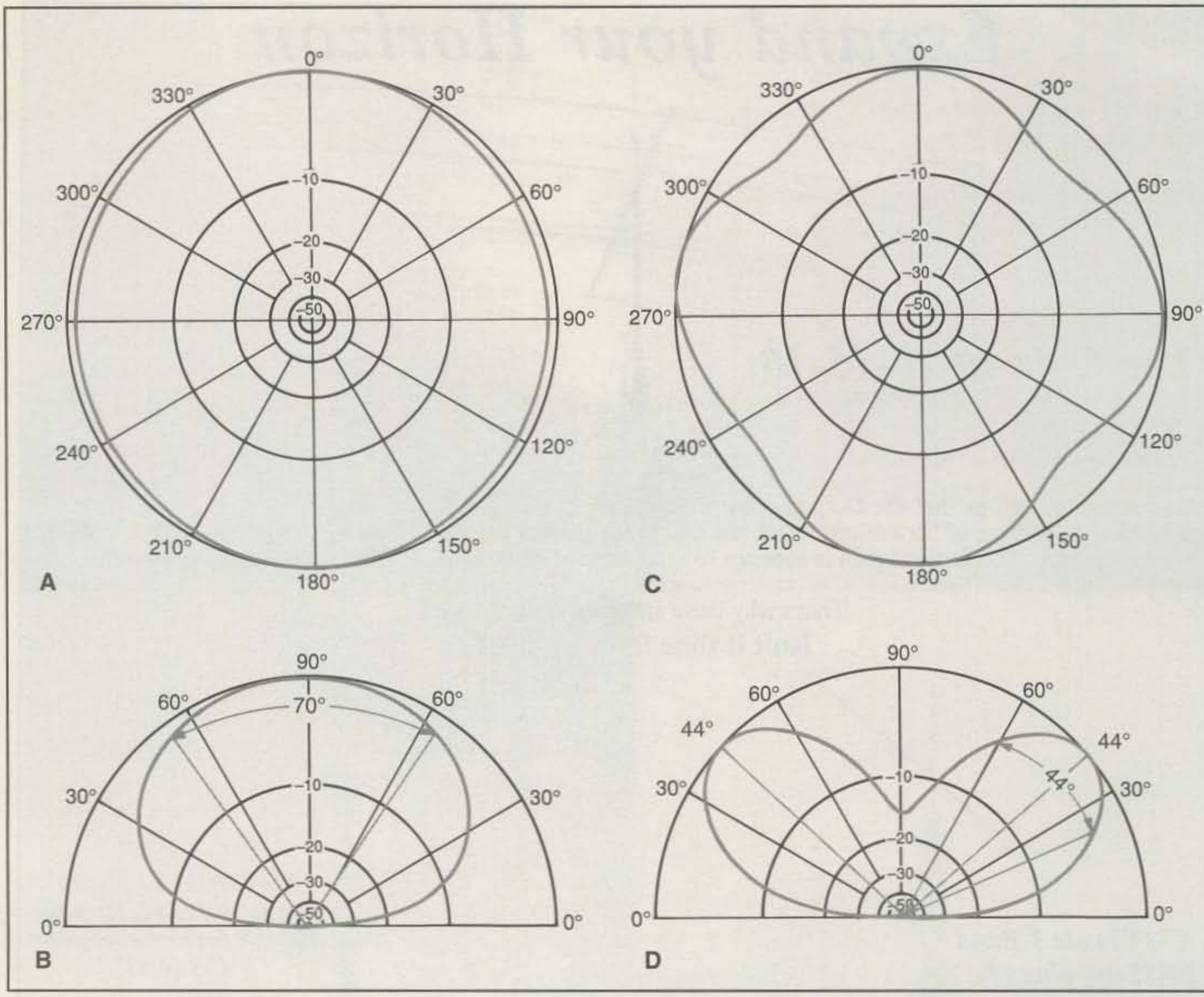

Fig. 3– (A) The horizontal pattern for the loop on 75 meters. (B) The 75 meter vertical pattern. (C) The 40 meter horizontal pattern. (D) The vertical pattern on 40 meters.

drop wires do not occur at points on the antenna on 3.85 MHz where they can add significant capacity to ground. The completed antenna is shown in fig. 2.

Not much is written about the impedance of a loop that is two wavelengths around. I picked a figure of about 300 ohms as a "seat of the pants" guess and proceeded fearlessly from there. (This figure was confirmed as "in the ball park" when a computer analysis was run later.) Assuming that the impedance would be in the 300 ohm range, the impedance presented by the 4:1 balun would be about 75 ohms. The quarter-wave section used as a match on 75 meters would now be about a half wave long on 40 meters, and as such should present close to 75 ohms to the terminal end and the TV hardline. Again, checking the impedance at the end of the matching section with the antenna scope, I got another reading of 68 ohms.

I think about here I should point out that a difference exists between the 75 meter length of a quarter-wave section and the 40 meter length of a half-wave section of 52 ohm coax. Using the standard formulas for determining matching sections, the 75 meter quarter-wave section should be 40.7 feet long and the 40 meter half-wave section should be 43.5 feet long. A compromise of 42 feet was chosen, and the aforementioned impedances were made at the end of this length of 52 ohm coax. No effort was made to run this dimension through the Smith chart route, but Lady Luck sometimes smiles on the lazy and things work out about the way they should. So you other lazy people take heart!

The proof of the pudding is in the eating, so I have been told. The SWR changed very little from one end of the 40 meter phone band to the other, and required no assistance from a tuner. However, the SWR rose as I expected, as the frequency was moved above or below the design frequency of 3.850, and a tuner was added to help out the exciter when operating "barefoot." The linear took the slightly higher SWR in stride and no tuner was necessary. A matching device to match the 75 ohm cable to the 50 ohm "barefoot exciter" might reduce the need for a tuner. There are several articles in amateur publications and at least one book written on such matching devices (see *Building and Using Baluns and Ununs,* by Jerry Sevick, W2FMI, available from CQ Communications, Inc.). So far I have not tried this route. I do know, however, that once the antenna tuner has been adjusted for a 1:1 SWR at 3.850 MHz, a 1:2 SWR across the entire width of the 75 meter phone band as a worse case is achieved without retuning the antenna tuner.

The question is always asked, "What about the other bands?" Operation on all the higher frequency bands was tried with the exciter "barefoot" and an antenna tuner in line. The results were encouraging, since good reports were received on all of them. A tuner was used on these bands, since the SWR was too high for the exciter without one. No effort was made to operate with the linear, since I had not made an analysis of what would happen to the 4:1 balun. I have burned out a couple of baluns in the past trying stunts like this, and wasn't anxious to lose another.

I can say, however, that good, solid contacts were made on all bands except 160 meters, and no problem matching with an MFJ901 tuner was encountered on any of the bands. True, the antenna turned out to be no match for a multi-element beam at the same height, nor was it expected to be.

For those who are unhappy without a computer readout (and I wonder how we ever got

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along before the computer!), I turned over the final design to WA4HTR (now a silent key) and W4TDI, who were computer literate. They ran off a series of charts for the several bands. The results confirmed the on-the-air results I had encountered in using the antenna.

"A picture," some ancient philosopher said, "is worth a thousand words." I believe it. Fig. 3 shows a rundown of the computer pattern of the antenna as promised earlier. You will notice that the 75 meter patterns as shown by fig. 3(A) and 3(B) are exactly as expected from other classic full-wave loop antenna articles published before—a high-angle, non-directional radiator capable of good local coverage and fair DX capability.

The 40 meter patterns, however, are a bit more interesting, showing a "not quite round" but generally nondirectional coverage as seen in fig. 3(C) and a somewhat lowered angle of radiation than that found in the 75 meter operation as shown by fig. 3(D).

Patterns for the other bands pretty much follow those published in numerous other articles for 80 meter full-wave loops mounted horizontal to the ground. To prevent redundancy they will not be shown here.

Anyone studying this antenna, or building one, will probably have some questions. While I have spent several weeks, and numerous rewrites, preparing this article, there is always some aspect that is either omitted or given the "broad brush treatment" and that requires a few well-chosen words to clarify. To those people who need more "dope," an SASE will bring the best answer I can give. Mail to: 62 East Higley Road, Colton, NY 13625. Even if you do not have a question, I would appreciate comments. ■

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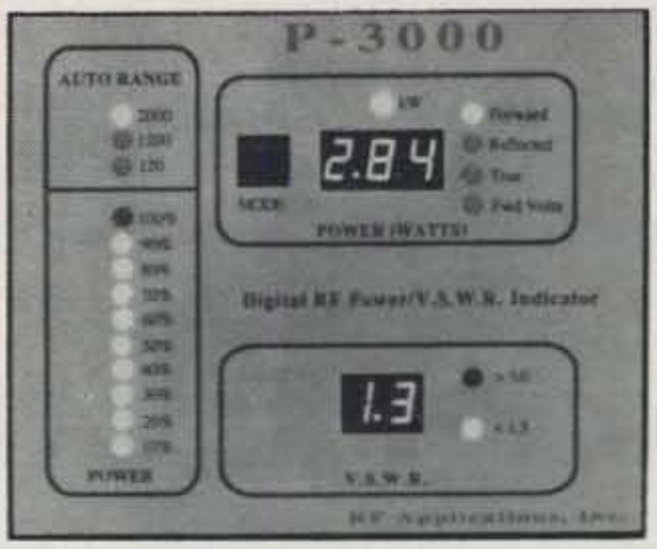

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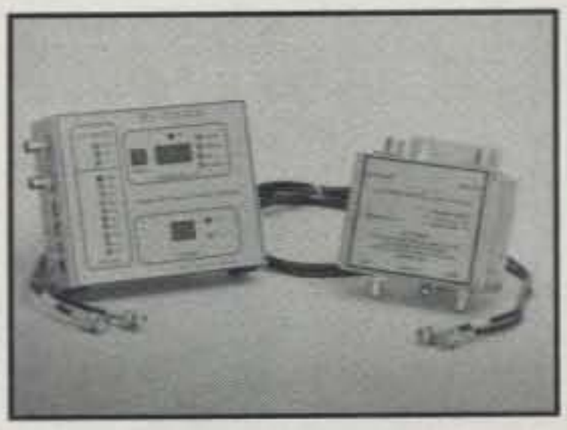

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CIRCLE 72 ON READER SERVICE CARD

This article is for all the rest of us. We know who we are. It's also for those who over the years have written to me and decried the articles showing the perfect stations, the perfect antenna installations, and the ideal (often expensive) display of amateur technology. We salute our brother, W7KCN, for his dogged determination and perseverance in the noble cause of the world's greatest hobby and for vindicating the rest of us.

Antennas Hate Me!

BY JOHN K. MUNROE*, W7KCN

I can't imagine why they hate me. I love antennas. It could be all those years of heavy feeding at the wrong impedance, mismatches, bad weather, rotten coax, frayed wires, cracked insulators, etc. They're getting back at me.

It began in my home town not long after I got my license 52 years ago. I dickered with a farmer and bought an unused windmill tower. A friend with a semi truck hauled it home for me. We dragged it to the backyard and set it up. It held a couple of nice three-element 10 meter Yagis, until one summer afternoon when I was working. A strong wind came up. I immediately thought of my new tower. I had neglected to guy or fasten it down. When I got home, it was a sight to make you cringe. The tower had fallen over on the power lines to our house, snapping a couple. The next day while I was back out in the fields at work, my dad called the power company. Away went the tower. I was afraid to ask any questions. I was just anxious to forget the whole dismal thing. I put up a dipole.

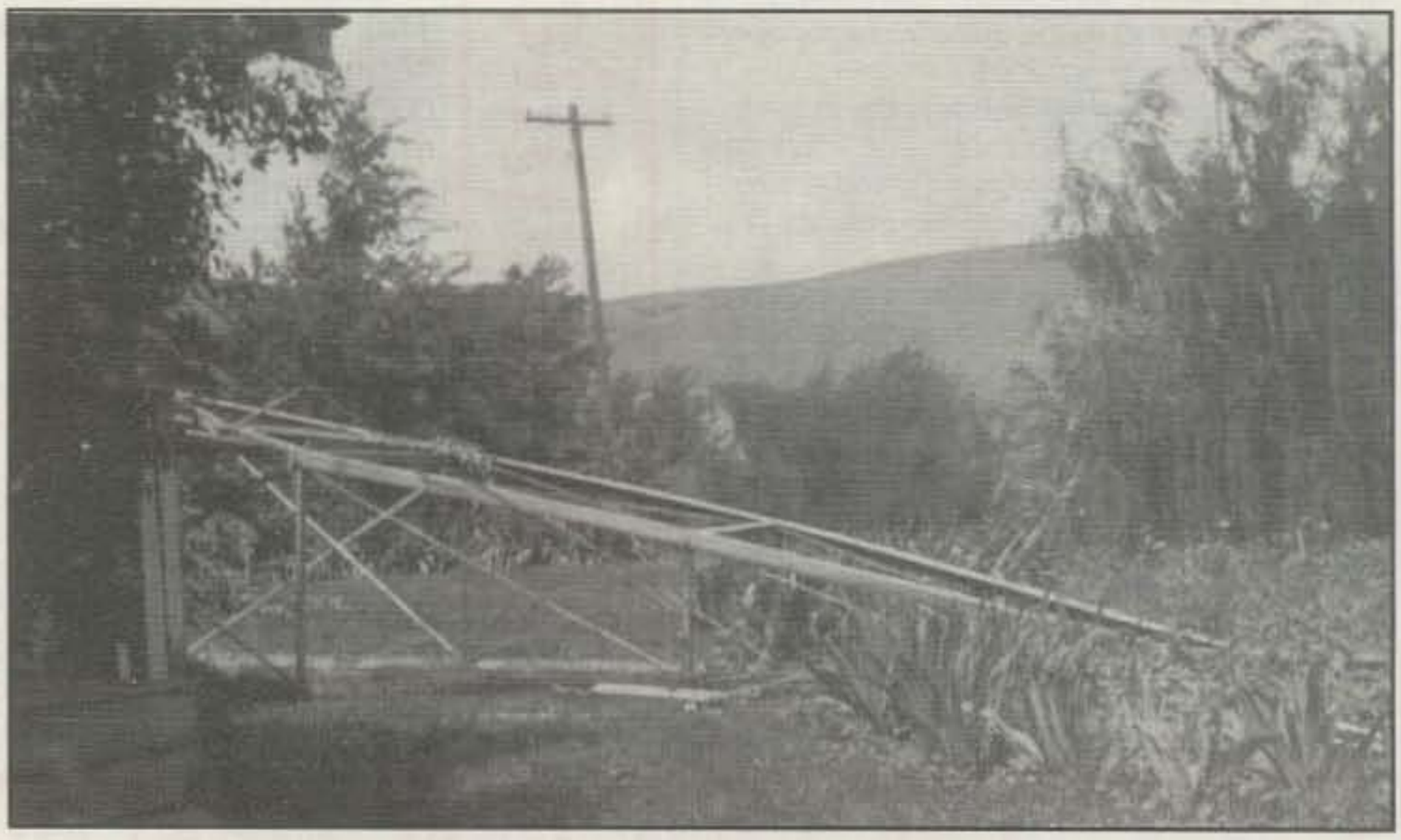
The next mishap occurred when I was away at college. The fraternity gave me permission to mount a small three-element beam on the chimney. It worked fb until a 50 mph gust took down the beam *and* the chimney. That cost me plenty. And no more antennas.

Antennas left me alone while I served in the Navy and finished college, but they were only waiting for the next opportunity to get me.

Soon after I got married and moved to a nearby island, I felt the persistent tug of DX again. Our little house was right on the beach with an 80 foot fir tree just made for antennas. I sawed the top out of the tree, mounted a 3 foot tower section up there, installed a prop pitch rotator and a nice tribander—a prototype made by a company that had never been in the antenna business. It had no traps but relied on concentric tubing. Great idea. Weak tubing. The first 40 mph wind bent the dickens out of it and down it came.

Next up was a homebrew, five-element, 20 meter monobander on a 30 foot length of irrigation pipe. It took a 50 mph wind to destroy that one. I'll bet you don't appreciate how hard it is to get a five-element beam up through the branches of an 80 foot fir tree.

We moved to the mainland soon after that. I bought one of the early-model crankup towers. The idea appealed to me. When the wind blows, just crank it down out of the wind. It doesn't work that way. Those early towers had to be guyed. When you release the tension on the guys to crank down the tower, the wind bends it. It stuck there bent for quite a while. I know I should have been able to figure that out, but what can I say?



The start of it all, the fallen windmill tower. With all the free space available to fall, it aimed itself at the power lines.

I stayed with dipoles for several years until the sunspot cycle began to rise in about 1989. Along came the next outrageous catastrophe. My mistake in this instance was using an inferior grade of tubing for the elements. They all bent that winter.

I had a 100 foot tower pieced together from several other brands of towers (cheap). I brought down the broken beam and put up a commercial, four-element, 20 meter monobander. It worked really fine for a while. Then one breezy day I came home, turned the corner near my house, and could see the tower was leaning about 5 degrees. The wind was fairly brisk, but I thought surely I had it guyed well enough. I dashed out to the shop, grabbed a rope and a ladder, and planned to climb up as far as it seemed safe to try to secure the tower from collapse. I could see a guy had let go at the top. It couldn't be at the bottom. As I stood there looking up one last moment, the Yagi folded itself over and the top 60 feet of the tower came crashing down. Probably good timing. I discovered why the guy had parted. I had bought all new galvanized, quarter-inch steel cable, but had run short about 6 feet. I had a short piece in the shop and spliced that on. Hadn't noticed it was aluminum.

The conflict continued, but still I survived. When that tower came down, it left standing, at a tilt, 40 feet of doubtful-grade "heavy duty" tower. The bottom 6 feet was flanged out, which gave it a wider stance, but also less torque resistance. Observing that, I built a frame around that section and poured it full of concrete. So there I had a 6 foot high, 3 foot wide hunk of concrete. I pulled over the whole thing with my truck, but couldn't think of a way to get rid of that big chunk of concrete. One rainy Saturday I decided to dig a hole and just bury it. So in the rain I dug a pit about 8 feet long and 4 feet wide and 4 feet deep. I planned to wedge the thing into the hole.

I finished digging the hole and had just begun a small undercut when my wife called from the shop saying she had a machine stuck and would I help her. I crawled grumbling from the hole to help, when at that instant, my pal John Permen, W6BMF, drove up. I said, "John, come over here and look at this hole. See if you think it's deeee!!! The entire concrete slab had slid silently into the hole! We stood there aghast for a moment until I realized my XYL

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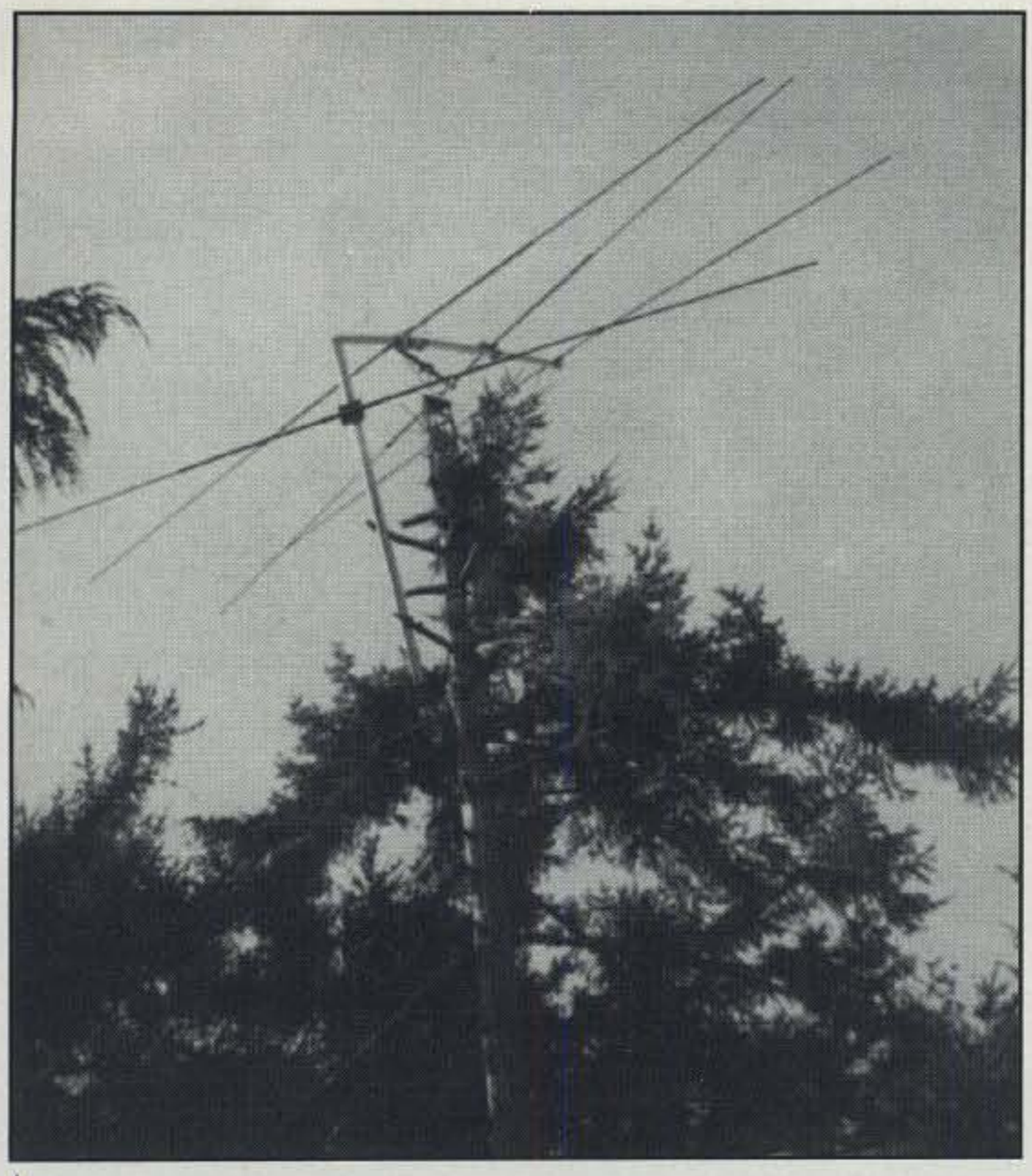

The tree was fine, but the five-element 20 meter monobander would never be the same.

The sheep were not amused as my "odds and ends" tower collapsed, giving new meaning to the term ground-wave. ➔

had saved me from being crushed like a grape by three tons of concrete and steel.

My house burned down four years ago. I thought surely all my antennas were safe—even the G5RV high over the roof. No. When firemen ripped a hole in my new steel roof (it took me all summer to put that up there), the flames leaped up and melted the ladder line where it fastened to the wire. I saved that piece for a souvenir.

Antennas really hate me. I put up ten more sections and a new four-element 20 meter monobander. On one of the nearly 130 climbs I had made up two towers in my field, I was reaching out to adjust something on the beam (100 feet up, remember) when it suddenly felt as if I were reaching a bit too far. Inspection of my belt showed I had wrapped the chain around the tower, but had hooked it not on the belt, but on a tower rung. A misstep there would have let me down very fast to the 94 foot level.

Antennas hate me all right. When I put up that tower, I got to the 70 foot level and couldn't get one leg to seat onto the one below. I brought up a big hammer and pounded and pulled, but it wouldn't budge, so I climbed up and figured I'd put a little weight on it. As I climbed up, the new section didn't come down. Instead, it tipped OUT—only a few inches, but enough to momentarily forecast the immediate end of my currency. Wow, that was scary!

All my antennas are in cahoots. My four-element 10 meter Yagi suffered an injury when it fell off the roof, where I had been keeping it temporarily between towers. The factory sent me new parts and I fixed it. I had it propped up on 2× 4's in the backyard ready to hoist

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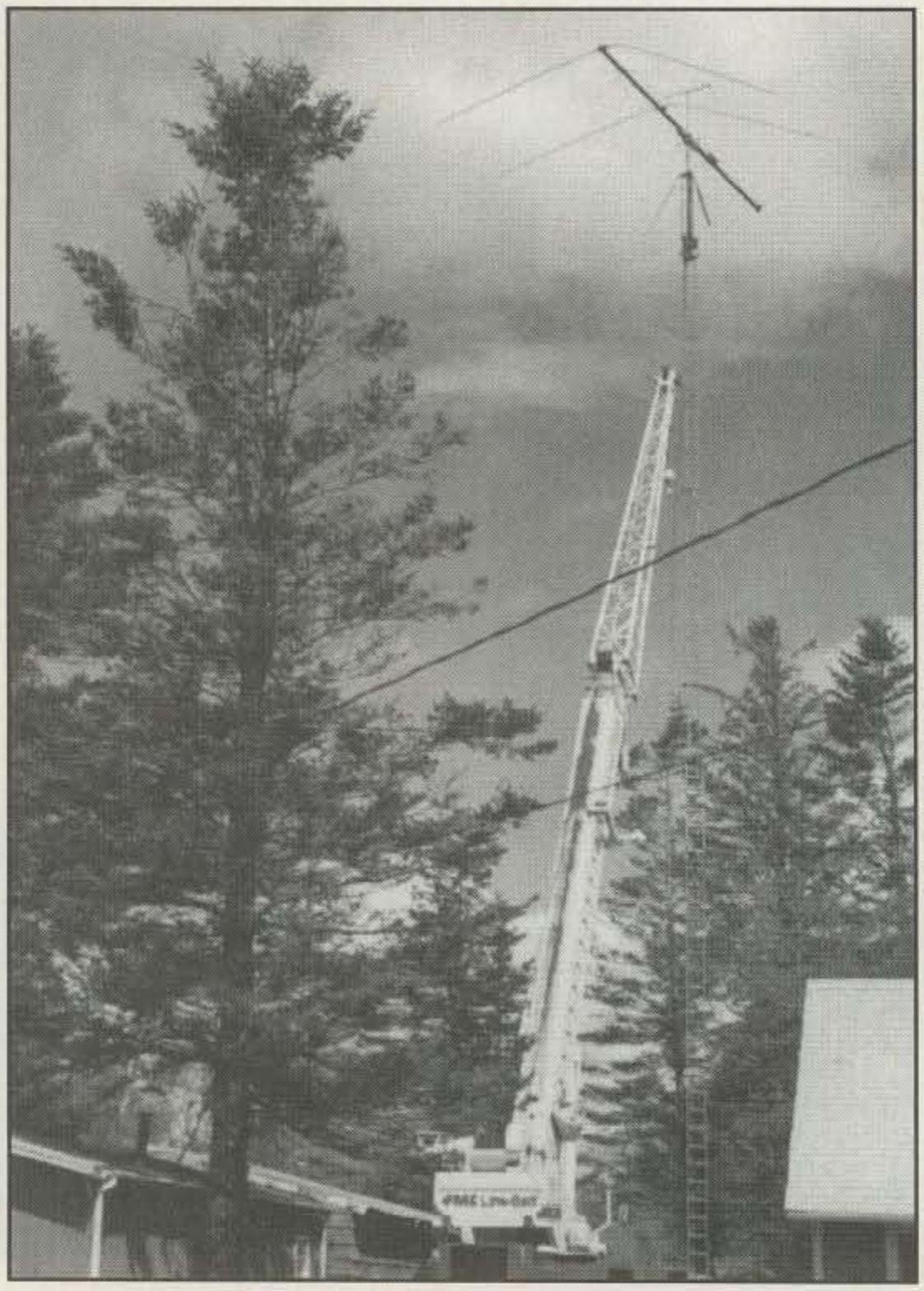
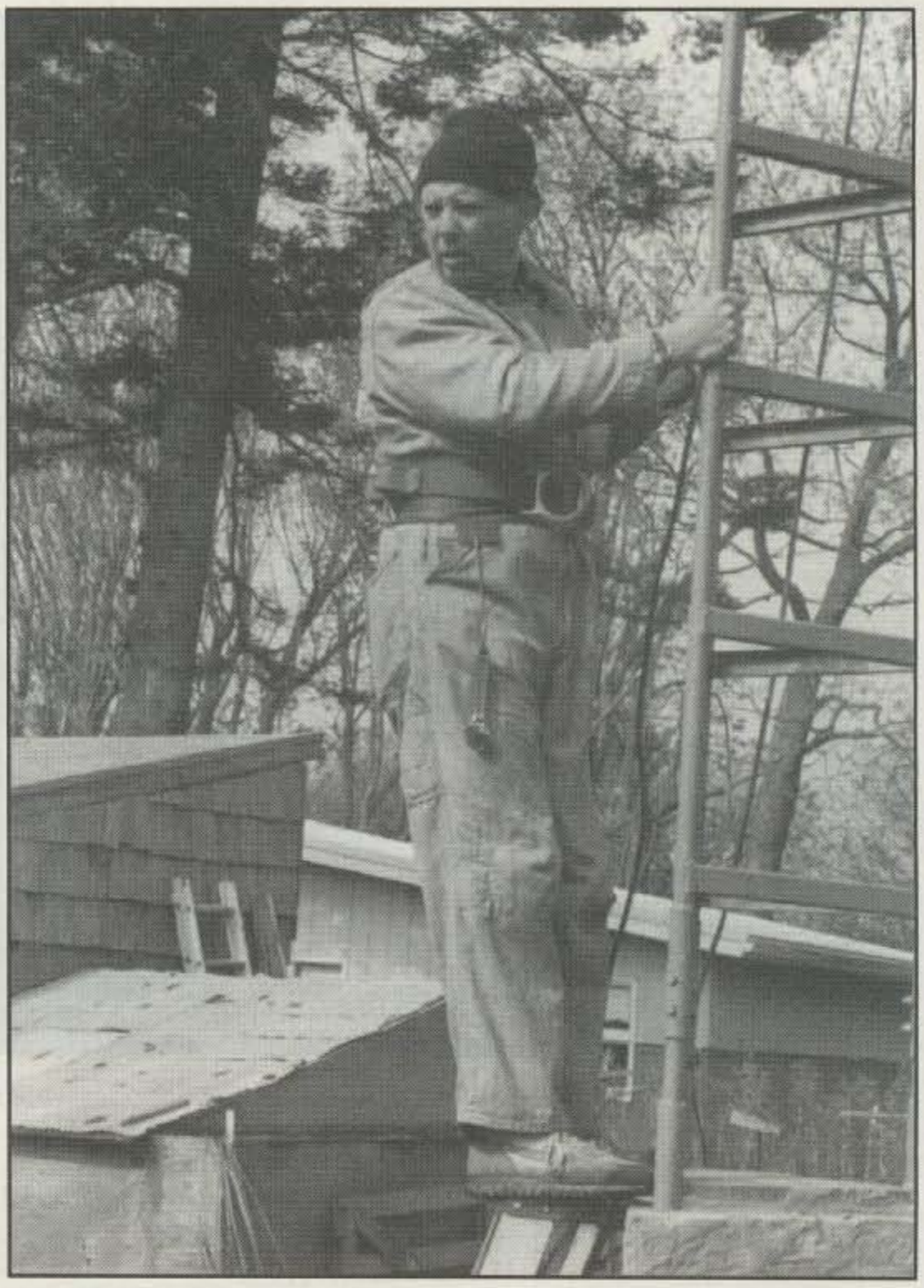
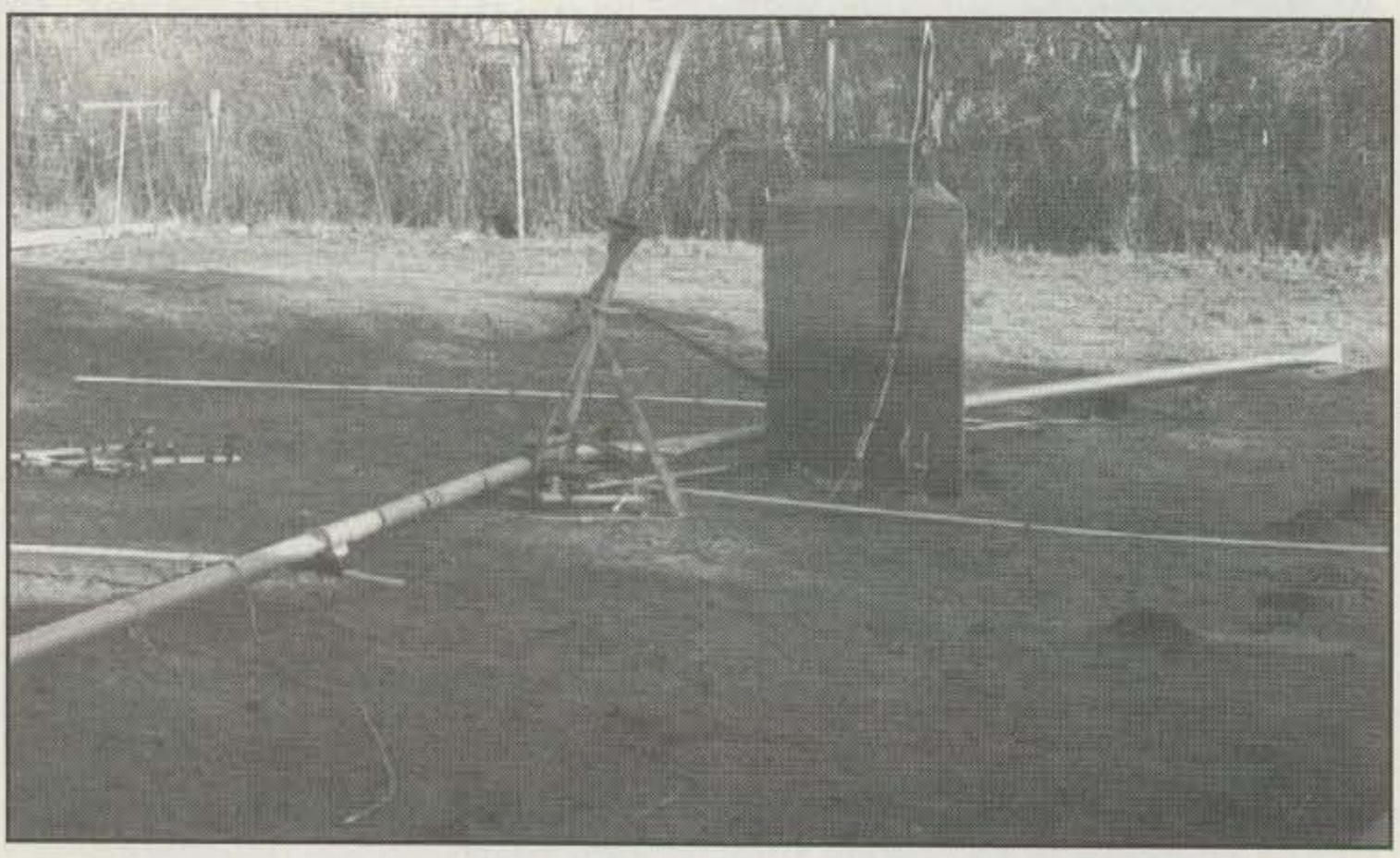


I know it was weak tubing and not simply that the antenna was sleep ing which caused the demise of this 20 meter monobander.



Undaunted, head held high, the author prepares to ascend another tower and do it all over again.

back up fixed and tuned. That night at about two o'clock in the morning my XYL and I heard voices outside the bedroom window. We live out in the country. Voices in the yard are uncommon at that hour. I raised the window and hollered out, "What's going on out there?" A person with a strong flashlight and restraining a dog answered, "Police officials, sir. Did you see anyone come through here in the last few moments?" Some tempting but impolite answers suggested themselves to me, but I told him I had not.



Just your average antenna wreckage next to the infamous concrete monolith. If it wasn't for my wife's opportune call, all they would have had to do was carve my name on the side.

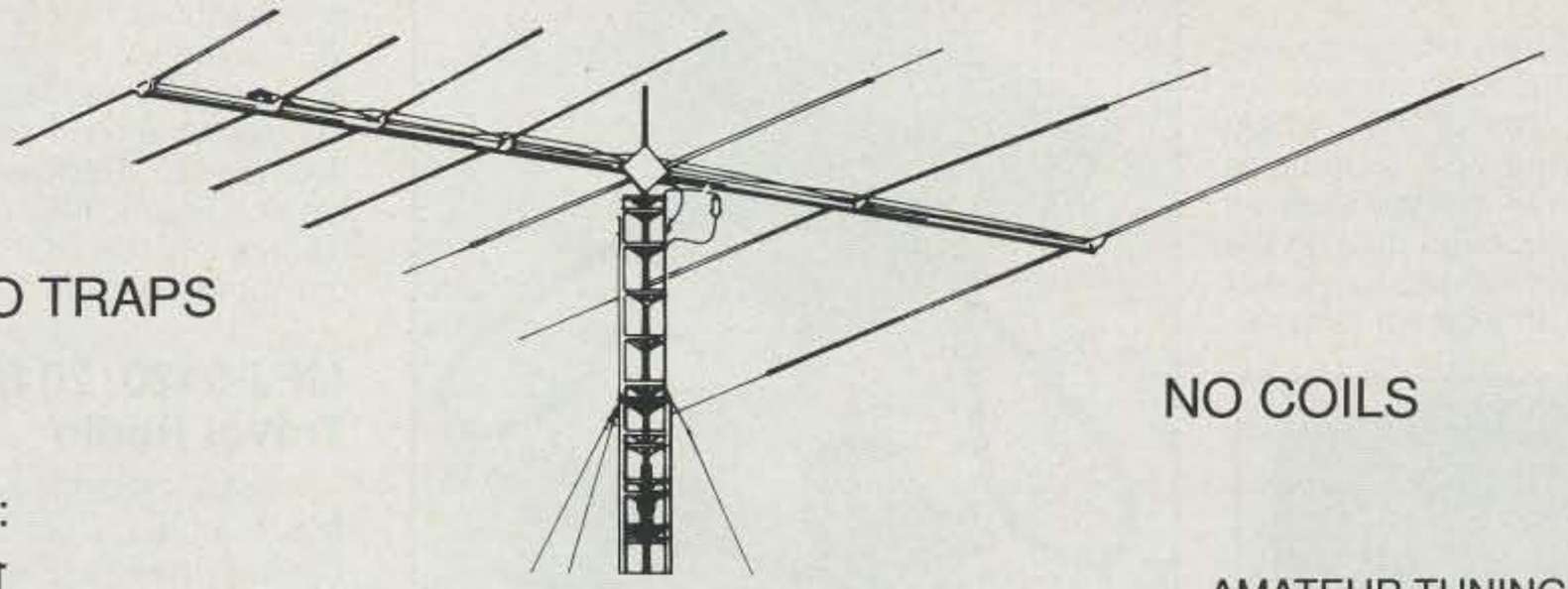
Police had been chasing a thug across county roads at speeds near 100 mph. He chose our road for his escape. He slid into my son's yard next door, leaped out of his car, dashed across the field past my garden and through my backyard, and headed for the canyon, where he could make his escape up the beach. Did you guess it? Yep, he hit my antenna I'd say just about 6 inches below his buckle and BROKE IT AGAIN!!! I hope that caused him anguish and pain. He made good his getaway, though. Police searched my entire premises and noted the damage to my antenna before they left. I called the manufacturer. He was so entertained by my story, he sent new replacement parts at no cost.

I don't hold it against antennas. I remember during the CQ WW DX Contest one winter having to climb the 50-footer at 10 o'clock at night in a 40-knot gale with heavy rain coming down as I held a small flashlight in my teeth and fumbled with numb fingers for wet, cold tools to try to keep the beam from swinging so far in the wind. Antennas have a right to behave that way. It's the other things that bug me.

Today I got my revenge. The freight company delivered a motorized, 72 foot, self-supporting crankup tower I bought at the DX convention in Visalia. Have a nice day. ■

Say You Saw It In CQ

KLM 10-30-7LPA Continuous Coverage 10-30 MHz



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Patcomm PC-16000 HF Transceiver

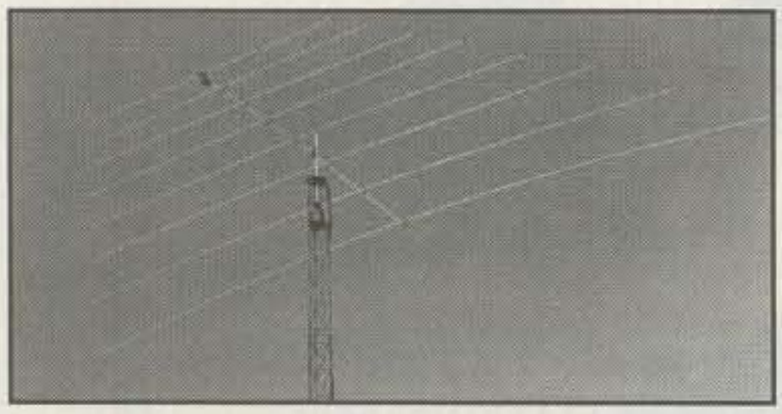
The PC-16000 state-of-the-art HF transceiver has two microprocessors used to control the transceiver functions. An internal TNC which digitizes incoming CW and FSK signals is included, allowing the internal microprocessors to decode and display the received data on the front-panel LCD. Data is also echoed out one of two serial RS-232 ports so an external terminal-

type device can be used for auxiliary full-page display. Standard software supports Baudot, RTTY, ASCII, and CW modes. Future software upgrades will allow packet and AMTOR support as well.

The PC-16000's transmitter provides up to 100 watts output power and can transmit in USB, LSB, CW, FSK, AM, or FM modes. General features include RIT, split operation, built-in iambic electronic keyer, built-in CW/RTTY keyboard, clock, direct frequency entry via front-panel keyboard, and more. Dimensions are 14.25"W × 13.5"D × 3.5"H, and weight is approximately 15 lbs. For more information, contact Patcomm Corp., 7 Flowerfield M100, St. James, NY 11780 (phone 516-862-6512, FAX 516-862-6529) or circle number 100 on the reader service card

Cushcraft ASL-2010 SkyLog Log Periodic Antenna

The ASL-2010 SkyLog five-band antenna covers 13.5 through 32 MHz in a single antenna. It uses a single feed line (balun included) and thus there is no need to switch antennas when changing bands. Wind load is 10.1 sq. ft. It will operate at full legal limit continuously. The ASL-2010's boom is 18 ft. long; gain is 6.4 dBd; and there are 8 elements (the longest is 38 ft.). The antenna has 6063-T832 aluminum tubular

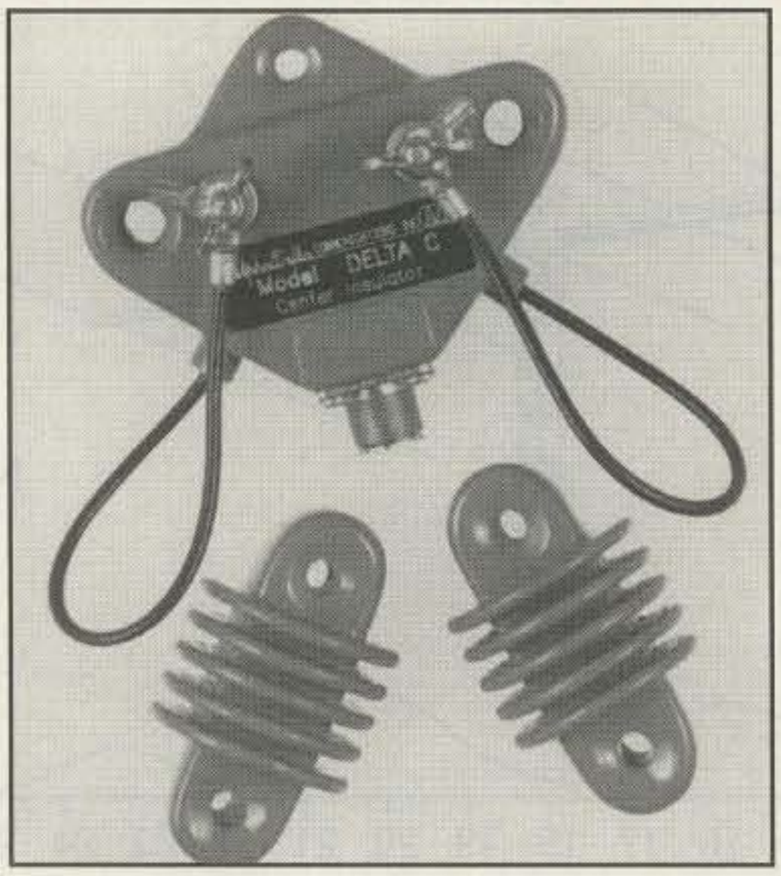


elements and boom. Brackets and mounting plates are also aluminum. All U-bolts and worm clamps are stainless steel.

List price of the ASL-2010 is $800. For more information, contact Cushcraft Corp., P.O. Box 4680, Manchester, NH 03108 (phone 603-627-7877; FAX 603-627-1764).

DELTA-C Antenna Hardware Kit From Alpha Delta

The DELTA-C antenna hardware kit consists of a DELTA-C center insulator, two DELTA-CIN end insulators, a SEP static discharge car-



tridge, and instructions for using the kit to build simple wire dipole antennas. The components are molded of high-impact UV and RF resistant material, the color is gray, and stainless steel is used for exposed hardware. The parts have a 1 inch cross section to safely sustain heavy wind and ice conditions.

Alpha Delta also makes the model DX-ULTRA SWL antenna system, a multi-element dipole designed to be mounted as a dipole or inverted Vee. Total length is 80 ft. The antenna is built using the DELTA-C center insulator, DELTA-CIN end insulators, and SEP static discharge cartridge. Components are of a consistent gray color.

For more information on the DELTA-C kit and DX-ULTRA antenna, contact Alpha Delta Communications, Inc., P.O. Box 620, Manchester, KY 40962 (phone 606-598-2029; FAX 606-598-4413), or circle number 101 on the reader service card.

Collins PropMan™ HF Propagation Software

Rockwell has announced that version 3.1 of the PropMan™ high-frequency propagation resource manager software is now being offered to the general public at $49.95. It was originally developed by the Collins Avionics & Communications Division (CACD) of Rockwell for use by U.S. and foreign governments.

With a desktop or laptop computer, PropMan software version 3.1 permits the user to determine the best frequencies on which to communicate between two selected locations anywhere in the world. The software takes into account various parameters pertaining to the day, time of day, station equipment, and ionospheric and solar information. It provides HF analysis capability for frequency management, allocation, and usage. It enhances the RF spectrum user's ability to use complex skywave propagation models through use of the integrated inputs from the IONCAP Program to improve prediction accuracy. With a telephone line connection, the software also can translate and plot real-time satellite data generated by the Space Environmental Services Center (SESC), and use these inputs to improve prediction accuracy.

PropMan consists of two 3.5 inch computer diskettes, a quick-start guide, and an on-line operator's manual. (Two 5.25 inch diskettes are available on request.) Computer requirements include a 286 or higher processor (math co-processor is highly recommended), a color VGA screen, and two megabytes of conventional memory. PropMan is priced at $49.95, plus tax, shipping, and handling. For more information, contact Rockwell International Corp., 350 Collins Road, NE, Cedar Rapids, IA 52498 (orders 800-321-2223, or 319-395-5100), or circle number 102 on the reader service card.

MFJ-9420 20 Meter SSB Travel Radio

The MFJ-9420 is a 20 meter SSB travel radio that features a calibrated S-meter, Constant Current speech processor, and a custom-built reduction drive ball-bearing VFO capacitor. The 9420 transmitter was designed to deliver maximum talk power from easy-to-carry power sources, such as nickel-cadmium, D cells, or the MFJ-4110 wall adapter power supply. The MFJ-9420 has a Motorola PA transistor that runs cool and tolerates 3:1 VSWR and accidental feed-line shorts or opens. The design features plate-through PC board, brushed-aluminum panel, and vinyl-clad case and comes

with MFJ's one-year unconditional guarantee.

For more information or to order, contact any MFJ dealer or MFJ Enterprises, Inc., P.O. Box 494, Mississippi State, MS 39762 (601-323-5869; fax 601-323-6551; order toll-free 1-800-647-1800); or circle number 103 on the reader service card.

PowerTalk™ ADSP™-SNS™ Control Head For SG-2000

PowerTalk is a full-featured ADSP™-SNS™ control head for SGC's Model SG-2000 or SG-2000SP transceiver. SGC's PowerTalk incorporates adaptive digital signal processing and spectral noise subtraction. Operation is via LED indicators. The PowerTalk ADSP reduces unwanted noise. In addition, the user can adjust the frequency range by means of Upper and Lower Corner frequency controls, and can then adjust the center frequency up or down via the spinner knob control. The SNS feature subtracts noise in the spectrum where voice modulation is not present. A notch filter feature allows up to 5 tones to be suppressed simultaneously,

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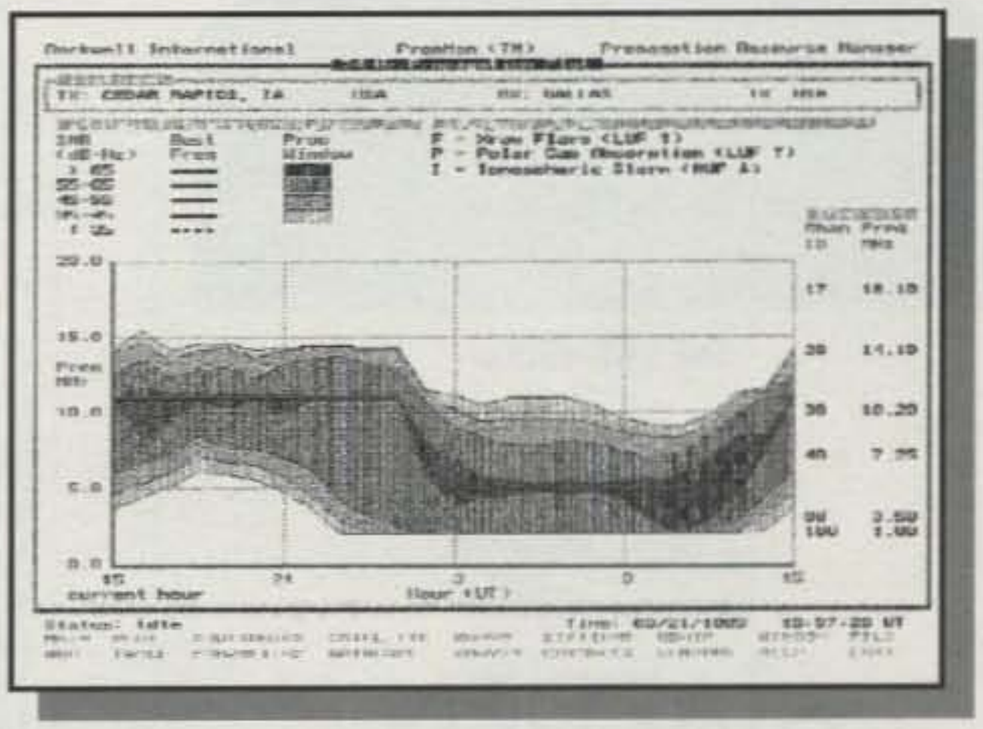

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- DOS 3.2 or higher

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and user memory (8 preset and 7 user programmable) allows the operator to configure frequency and mode.

The PowerTalk control head is designed to operate with the SG-2000 or SG-2000SP transceiver. The SG-2000 series of SSB radiotelephones are 150 watts and 644 channels and operate in the 1.6 to 30 MHz range. For more information, contact SGC, Inc., P.O. Box 3526, Bellevue, WA 98009 (phone 1-800-259-7331; FAX 206-746-6384); or circle number 104 on the reader service card.

ICOM IC-W31A Compact Dual-Band Handheld

ICOM has introduced a dual-band handheld that measures 2.2"W × 4.9"H × 1.2"D. A total of 104 memories may be displayed by either frequency or alpha name. Up to six alphanumeric characters can be programmed. Each band has 50 memory channels (43 regular, three pairs of scan edges, and one call channel). Memory management allows the user to transfer memory contents to either VFO or to other memories

while an EEPROM prevents memory loss if the battery runs low. Six DTMF memories have up to 30-digit message capability. A power MOSFET module provides high-power output even under low battery voltage. Three levels of power output are available, including low.

The ICOM IC-W31A has backlit keys, full crossband duplex operation, and two dials for independent tuning on VHF and UHF. V/V, U/U, or V/U main/sub-band operation is also possible. For more information, contact ICOM America, Inc., 2380-116th Ave. NE, Bellevue, WA 98004 (206-454-8155); or circle number 105 on the reader service card.

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Only MFJ gives you tunable and programmable "brick wall" DSP filters

MFJ-784B

$239.95

Patent pending

You get MFJ's tunable FIR linear phase filters that minimize ringing, prevent data errors and have "brick wall" filter response with up to 57 dB attenuation just 75 Hz away.

Only **MFJ gives you 5** ***tunable*** **DSP filters. You can** ***tune*** **each lowpass, highpass, notch, and bandpass filter including optimized SSB and CW filters. You can** ***vary*** **the bandwidth to pinpoint and eliminate interference.**

Only **MFJ gives you 5** ***factory*** **pre-set filters and 10** ***programmable*** **pre-set filters that you can customize. Instantly remove QRM with the turn of a switch!**

You get MFJ's ***automatic notch*** **filter that searches for and eliminates** ***multiple*** **heterodynes.**

You also get MFJ's advanced ***adaptive noise reduction.*** **It silences background noise and QRN so much that SSB signals sound like local FM.**

The ***automatic*** **notch and** ***adaptive*** **noise reduction can be used with** ***all*** **relevant tunable pre-set filters.**

Automatic gain control **(AGC) keeps audio level constant during signal fade.**

Automatic notch filter

MFJ's automatic notch filter searches for and eliminates multiple heterodynes in milli-seconds. It's so fast, that even *interfering* CW and RTTY signals can also be eliminated.

With up to 50 dB attenuation, you'll copy stations otherwise masked by heterodynes.

Voice signals aren't degraded because the notch is extremely narrow.

Turn on *automatic* notch and you'll never hear unwanted heterodynes of tuner-uppers.

You can *selectively* remove unwanted tones using the two *manually tunable* notch filters --an MFJ exclusive. Knock out unwanted CW stations while you're on CW.

Adaptive Noise Reduction

Turning on noise reduction silences background noise. It reduces fatigue and makes noisy signals readable.

Noise reduction works in all filter modes and on all random noise -- white noise, static, impulse, ignition noise, power line noise, hiss.

The LMS algorithm gives you up to 20 dB of noise reduction. Noise reduction is adjustable to prevent signal distortion.

Tunable highpass/lowpass filters

For Voice and Data, nothing beats MFJ's exclusive *tunable* highpass/lowpass FIR linear phase "brick wall" filters.

You can tune the lower cutoff frequency 200 to 2200 Hz and the upper cutoff frequency 1400 to 3400 Hz. This lets you create *custom* filters for Voice, Data and other modes.

Signals just 75 Hz away literally disappear -- they are reduced 57 dB!

NEW MFJ-784B Features

- Tunable *Spotting Tone*™ -- an *MFJ invention* -- accurately tunes even the narrowest CW filter
- MFJ's exclusive *Adaptive Tuning*™ -- Center frequency tuning automatically becomes finer as you narrow bandwidth -- makes extremely narrow filters easy-to-use
- Improved automatic notch with *variable* aggressiveness
- New quieter audio amplifier gives you *full* 2½ Watts output
- Speaker ON/OFF button, phones always active
- Accurate easy-to-use input level indicator
- *Filter Talk*™ function sends precise filter settings in Morse code
- Filter automatically bypasses during transmit for monitoring CW sidetone, voice or data by sensing PTT line
- Improved manual notch in the CW mode
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- Noise reduction,automatic notch and tunable manual notch can be used in Memory mode
- Adjustable line level output
- More Mark-Space frequencies and baud rates for data filters
- Improved self-test for all digital circuitry, switches and controls

Unlike other filters, speech is not distorted by unequal time delay.

When signals are weak, you can improve copy by removing noisy high and low speech frequencies that contain little information.

On crowded HF bands, you can "slice-off" overlapping SSB signals to improve copy.

You can highpass filter out hum, pulses, rasp and other irritating low frequency noise.

Tunable bandpass filters

Narrow band signals like CW and RTTY jump out of QRM when you switch in MFJ's *exclusive* tunable FIR bandpass filters.

You can tune the center frequency from 300 to 3400 Hz, and vary the bandwidth from 30 Hz to 2100 Hz -- from super-tight CW filters to wide razor-sharp Data filters.

As you narrow the bandwidth, interfering signals drop out, because, just 60 Hz away, they're down by over 47 dB.

You can use narrower bandwidths to fight tough QRM because these linear phase filters don't distort signals with unequal time delays.

Even with the narrowest 30 Hz bandwidth, you'll never have a problem with ringing.

One position gives you two tunable filters you can use together. For example, tune one to mark, one to space and set the bandwidth tight for an incredibly sharp RTTY filter.

15 *pre-set* filters -- use factory set or program your own

You can select from fifteen convenient *pre-set* filters. Use them for SSB, AM, CW, packet, AMTOR, PACTOR, RTTY, SSTV, WeFAX, FAX or any mode you can think of.

If you don't like our pre-set filters, you can program your own -- *an MFJ exclusive!* Save center frequency/ bandwidth, lowpass/highpass cutoffs, auto/manual notch, noise reduction -- all filter settings -- in 10 *programmable* filters.

Only MFJ gives you the best of both worlds -- *tunable* filters to eliminate nearly any QRM and fast convenient *pre-set* filters customized for any mode.

Plus more . . .

A push-button bypasses your filter -- lets you hear the *entire* unfiltered signal.

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Ever wanted to try 160 meters but didn't have the room? AD1B shows us a quick field expedient to turn a G5RV into a 160 meter antenna, with all parts available from your local Radio Shack.

The 160-RV Antenna
A G5RV Adapter For 160 Meters

BY THOMAS M. HART*, AD1B

It's a result of having insufficient real estate to hang any sort of half-wave antenna or to install a vertical with proper radials. The size of my house lot, the location of the trees, and the position of the telephone and electrical services have made 160 meter operation impossible for over 25 years.

While strolling at lunch time and day-dreaming about antennas recently, I developed an idea for an adapter that would allow my G5RV antenna to operate against a counterpoise. The price was minimal, and Radio Shack carries all of the necessary hardware. In the event of catastrophic systems and theory failure, the components could be used for some other idea in the future.

The G5RV adapter makes the entire dipole a single element by connecting the tip and braid of the coax together. This works against a quarter-wave radial. My dipole is 102 feet long coupled to a 30 foot section of twin lead and 20 feet of RG-8X coaxial cable. In the interests of safety, I always detach the antenna from the house at an outside connection point and plug the antenna into a ground-rod system whenever it is not in use. I began this practice a number of years ago when a lightning bolt vaporized the center insulator of a W9INN dipole during a storm. That antenna was not connected to the house, but at that time I was not using a grounding system. There was a spectacular strike at 2 AM that I will never forget.

By inserting the adapter into the feed line at the point where the coax exits from the house, I created a perfectly functional, if unusual, 160 meter antenna.

The counterpoise, which is the other half of the antenna, is a 125 foot long insulated piece of #22 stranded wire that I soldered together from a collection of assorted odds and ends of wire spools. I have seen this basic design in print before. However, the examples I have seen are operated against a ground rod, with or without buried radials. The 1974 ARRL Antenna Book lists that design as a "T-Antenna"; manufactures, Antennas West, for example, have called it a "Marconi." Building a good RF ground has proven to be very difficult in my area due to soil conditions. Therefore, I decided to take a different route and used a single radial.

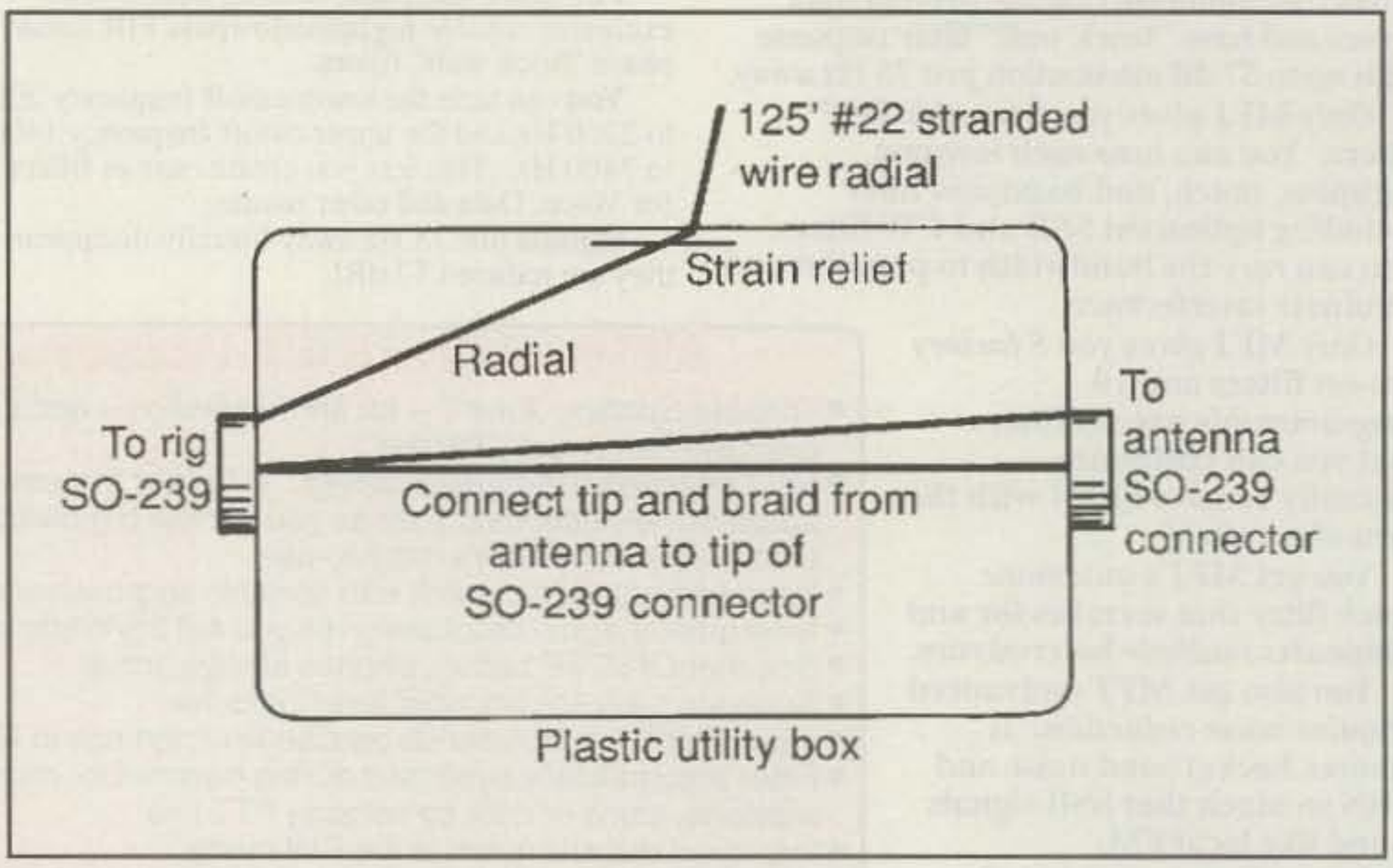

Fig. 1– The simple adapter for a G5RV antenna that will allow 160 meter operation. The adapter must be removed in order to operate the other bands.

My goal in assembling the 160 meter system was to try to make a few contacts during some of the 160 meter contests. In the course of the December ARRL CW Sweepstakes, for example, I was able to work 136 other stations during a few hours of operation. I managed to make contacts in a total of eighteen different states and Canada. I also worked 4UN1UN, the United Nations club station, during the contest.

My conclusion is that anyone who does not mind a few minutes of setup time but wants to work on 160 meters occasionally might do well to try the G5RV adapter for a temporary conversion of an 80–10 meter dipole system to a dedicated 160 meter antenna. The counterpoise loops around the yard, sitting on the ground, held in place with a few strategically placed stones. I use an MFJ antenna tuner that covers the 160 through 10 meter bands in order to keep my Kenwood transceiver happy with the system. My experience is that the bandwidth is fairly narrow, and returning is necessary when moving plus or minus 25 kHz. I was surprised to see that the SWR meter in my tuner does not seem to function well at the 160 meter end; I found myself making a final tuning for peak output. At some future point it would be very interesting to try the adapter with two or more counterpoise elements and see if that makes a difference.

Finally, the antenna must be doing quite a superior job. Every single report that I received during the contest was a resounding "599." ■

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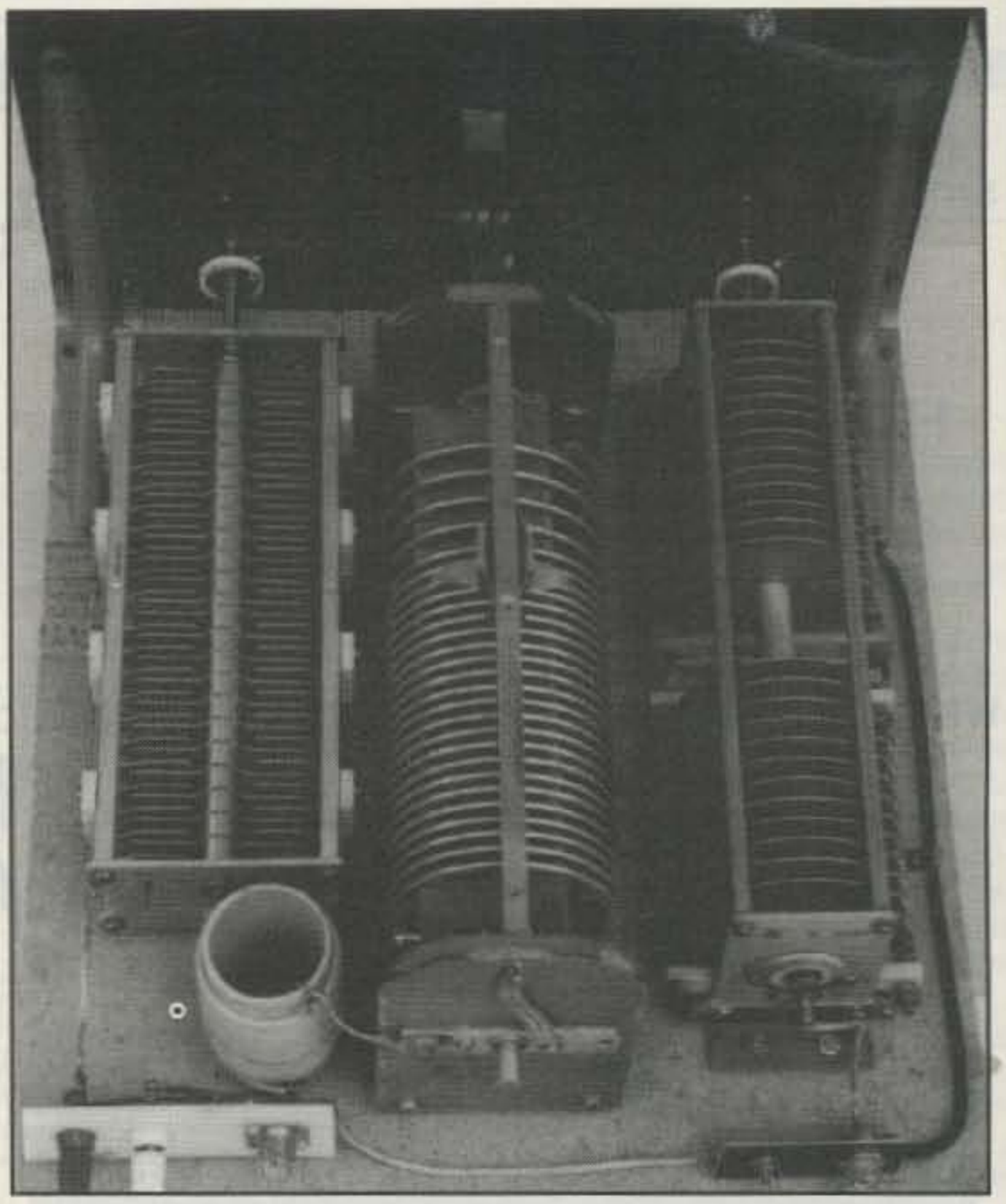
Fig. 2– Photograph of a T-network ATU that will accommodate power levels up to 3 kW peak. Note the wide plate spacing of the variable capacitors. The input capacitor is a dual-section unit with the sections connected in parallel. The large roller coil has a heavy-duty silver-plated conductor. The output jacks are mounted on a delrin plastic block to prevent arc-over at high levels of power. The output SO-239 coax jack has teflon insulation for the same reason. A wooden base is used as the tuner foundation, but the panel is made from aluminum sheeting. The capacitors are isolated from the panel by means of insulated couplings. A large flexible coupler joins the roller coil shaft to the surplus turns counter.



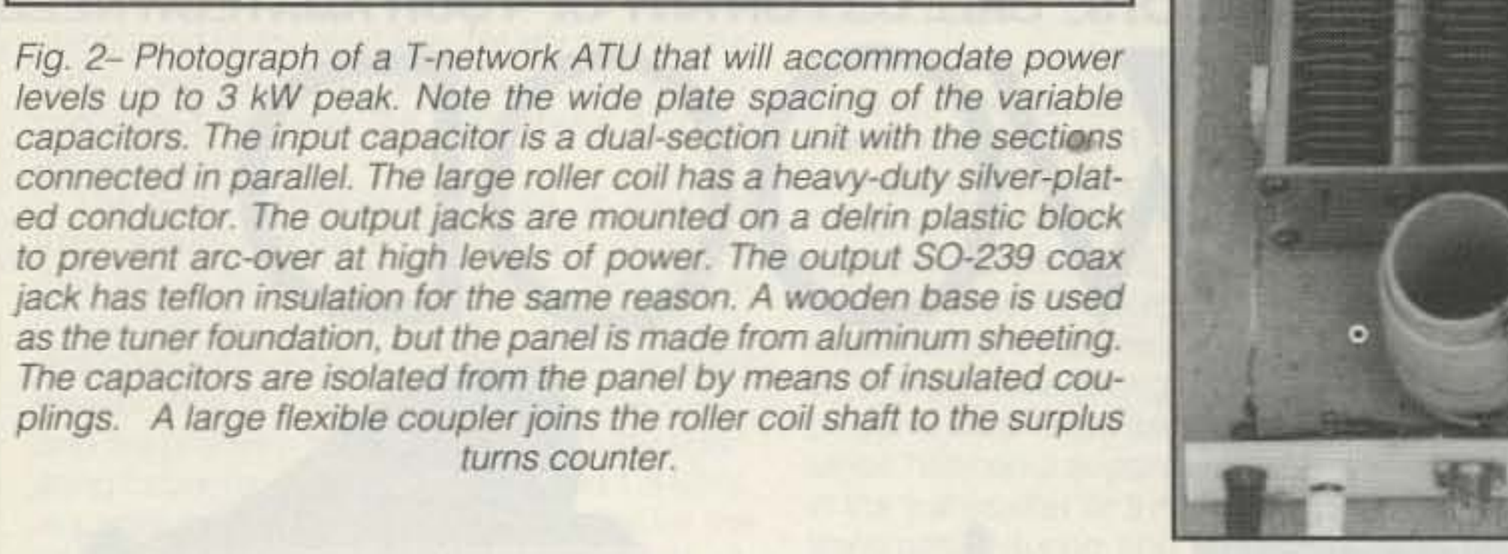


Fig. 3– Schematic diagram that shows how to add a coil (L2) for obtaining additional inductance on 160 meters. L2 consists of 15 turns of solid No. 12 vinyl-covered electrical wire on a 2 inch OD by 5 inch long section of PVC pipe (see text). L3 may be added for improved operation at 10 and 15 meters (see text).

with a 100 ohm load the developed RF voltage would be substantially higher, thereby reducing the voltage differential across C2. The same situation can exist if the load Z is high and the network Z is low. This can be the difference that prevents arcing. Changing the length of the balanced feed line may resolve this problem.

Coil heating may not occur on all of the bands. Again, this will depend upon the RF current that flows through the coil at certain settings of the three controls when feeding a particular multiband antenna. I had an antenna with which my tuner coil (E. F. Johnson roller inductor) ran cool on all bands except 40 meters. After a few weeks of operation the center turns on the coil turned black from excessive heating. Power is wasted when this situation prevails, since heat cannot be generated without dissipating power. The obvious cure for this malady is to use a coil with a much larger conductor size, such as that seen in the fig. 2 tuner.

160 Meter Operation

Some ATUs run out of gas, so to speak, below 3.5 MHz because the capacitors and coil are too low in value to provide a match at 1.8 MHz. A few tuners of commercial origin "almost make it" only at the high end of 160 meters, but that is with the controls set at or near their maximum values. Insufficient inductance is generally the cause of this ailment. Additional inductance (L2) can be inserted at the high-Z end of L1 in fig. 3 to cure the problem. An RF-rated SPST switch can be used to short the additional coil for operation above 2 MHz. If C1 and C2 have a maximum capacitance of 200 pF, they should be adequate for use at 1.8 MHz and above. A fixed-value, high-current, high-voltage capacitor may be shunted across C1 or C2 if those capacitors have values that are too low for 160 meters.

10 and 15 Meter Operation

Amateurs sometimes encounter matching problems when operating a homemade ATU at the upper end of the HF spectrum. This is because the lead lengths in the high-impedance part of the circuit are excessively long (inductive) and because the coil form factor (diameter to length) is so poor that the Q is extremely low: Only one coil turn, or less, may be required for a match at 10 or 15 meters. This prevents establishing the desired 1:1 or 2:1 form factor.

The usual cures for the malady are to shorten the leads between the variable capacitors and J1, J2, and L1. It is vital also to use wide conductors, such as ⅜ inch wide strips of copper. The wider the strips the lower the unwanted parasitic inductance. Also, C1 and C2 of figs. 1 and 3 must not have too great a value of minimum capacitance for operation at 10 and 15 meters. Mounting the capacitors at least 2 inches above a metal chassis lowers the minimum capacitance that occurs between the capacitor plates and the chassis.

The upper HF range problem can often be

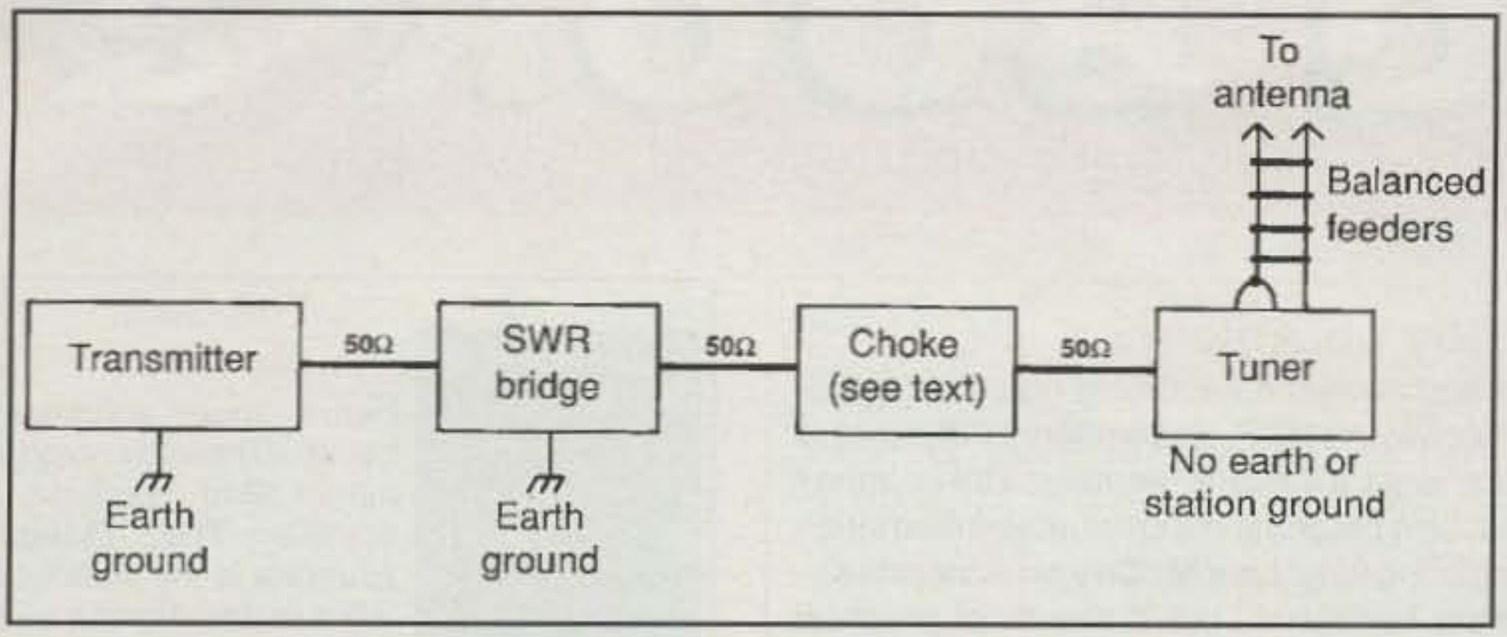


Fig. 4– Pictorial diagram that shows how to float an ATU by means of a 50 ohm RF choke. This technicnique makes it possible to use a single-ended ATU for feeding balanced feeders without employing a balun. An earth or station ground must not be attached to the tuner chassis when this system is used.

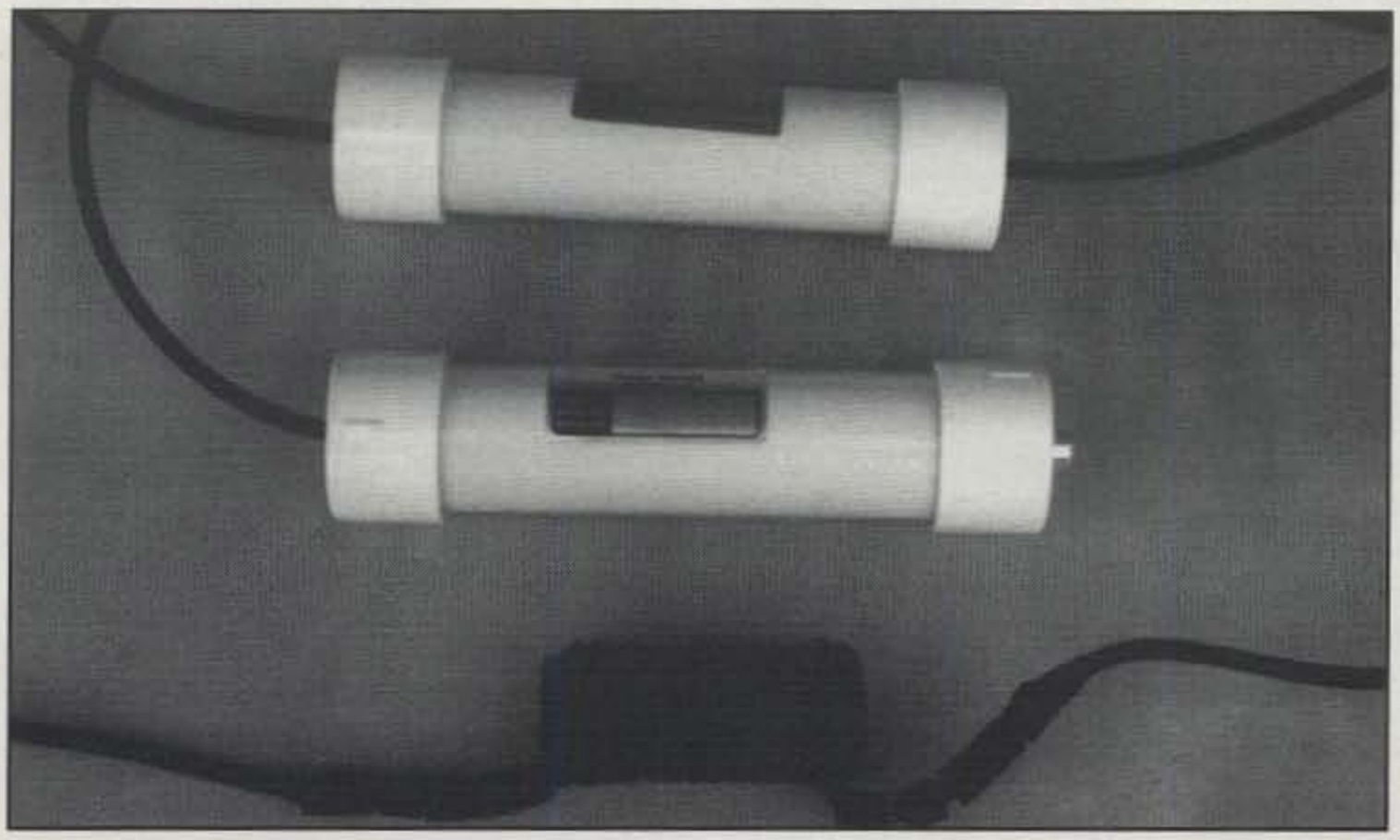


Fig. 5– Photograph of the W1FB homemade RF choke seen in the fig. 4 block diagram. Two commercial line isolators sold by The Radio Works are shown also (see text). The W1FB model consists of RG-8X coaxial cable wound to fully occupy a bundle of seven 3/8 × 6 inch 125 mu ferrite rods taken from scrap AM BC-band radios. The rods are held together by means of epoxy cement. Five Amidon Associates FB-43-5621 ferrite beads are slipped over the RG-8X at each end of the main choke. The choke winding and the beads are held in place with vinyl electrical tape.

resolved by adding a small, large-conductor coil in series with the main coil (L3 of fig. 3) at the high impedance end of L1. I use 5 turns of 1/4 inch copper tubing for this, wound for a 1 1/2 inch ID and a length of 3 inches. No switch is required for shorting this coil.

Other Construction Tips

I like to use a wooden chassis for my tuners because I object to paying the high prices being asked for commercially made metal chassis. Since tuners need not be shielded, wood is fine. A secondary benefit of using wood is that standoff insulators are not needed for the variable capacitors. These components can be mounted directly on a wooden base. There is no reason why plywood or masonite can't be used for the tuner cabinet and panel. The tuner in fig. 2 is built on a piece of 3/4 inch particle board. The panel is made from 16-gauge aluminum. Shelf brackets hold the front panel rigid.

Most ATUs tune sharply if the circuit Q is high. It is for this reason that I use vernier drives[1] for both capacitors. Insulated couplers are used between the drive units and the capacitor shafts. The dial numbers allow me to log the control settings for my popular operating frequencies—a great time saver when QSYing, especially during a contest.

Labels for the tuner in fig. 2 were made with my computer using WordPerfect software and a laser printer. I first created a figure box (ALT F9) of the desired size, deleted the wrap-around default (8 and N), and printed the control names inside the figure boxes with Helvetica font that was scaled for the desired pitch. The printout was reproduced on white poster board with a copy machine, after which the labels were removed with a paper cutter and pasted on the panel with contact cement. A coating of clear Deft brand spray lacquer or Krylon clear spray may be used to protect the labels. This method is much less frustrating than using press-on decals, which never seem to come in large sizes for big equipment.

Tuned Feeders Minus a Balun

There can be no more hostile an environment for a balun transformer than in a multiband antenna system that has balanced feeders. Very high impedances are reflected to the balun on some frequencies, and core saturation or arcing can occur. Furthermore, there is little or no true balance under these adverse conditions. Certainly, some tuner manufacturers who include built-in baluns fail to recognize this limitation.

In an ideal situation a balanced tuner, such as the E. F. Johnson Matchbox, would be used with a balanced feed system. However, the matching range of those units is limited, and they won't work on 160 meters. I was delighted when I ran across an excellent paper by A. Roehm, W2OBJ, that appeared in *The ARRL Antenna Compendium*, 2nd edition, on page 172. Roehm described a method for "floating" a conventional single-ended ATU (minus balun) for use with balanced feeders. The technique requires RF-isolating the tuner from the rest of the station gear by means of a 50 ohm choke (see fig. 4). There can be no earth ground attached to the tuner. One side of the feeder connects to the "hot" post on the ATU, and the remaining side is attached to the tuner chassis. I measured the currents in each feed line conductor on various bands and found them to be nearly identical, thereby indicating that balanced feed was occurring. The article also describes how to build the RF isolation choke from ferrite materials. Some of my amateur peers and I have used the Roehm system successfully for some time with 160 meter inverted Vs that are fed with 450 ohm ladder line. Fig. 5 shows my homemade isolation choke plus the 4K-L1 and Terminator-3 line isolators that are available from The Radio Works.[2] These chokes operate without discernible heating at maximum amateur RF power from 160 through 10 meters.

Tag Ends

If you use a linear amplifier, I suggest you build an ATU that can handle the onslaught of RF voltage and current under all matching conditions. I find that 1/4 inch or greater plate spacing in the variable capacitors provides more than ample reserve for my Ameritron AL-80A amplifier. The larger roller coils may be available at hamfest fleamarkets. I paid $50 for the surplus military Cardwell unit seen in fig. 2. However, don't overlook the merit of using a large homemade inductor with taps and a switch. These can be made inexpensively from 1/4 inch copper tubing. The taps can be selected experimentally for the antennas you normally use at various frequencies. Once the correct taps are determined they can be affixed permanently (preferably with silver solder).

Footnotes

1. Mouser Electronics, 2401 Hwy. 287 N., Mansfield, TX 76063-4827 (1-800-346-6873). Catalog available.

2. The Radio Works, P.O. Box 6159, Portsmouth, VA 23703 (804-484-0140). Catalog available. ■

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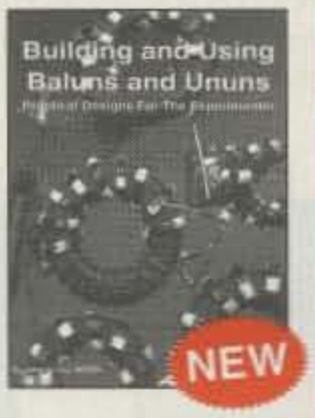

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ANTENNAS & ACCESSORIES

A LOOK AT THE SHACK FROM BOTH ENDS OF THE COAX

BY KARL T. THURBER, JR., W8FX

Book Nook

I've got a tall stack of books, magazines, and catalogs this month! With that in mind, we'll depart somewhat from our usual "antennas, accessories, and software" format to first cover some of these interesting amateur radio, shortwave, electronics, and computer publications. Let's begin with a stack of antenna books.

Book Nook: Reads For The Well-Read Amateur

The Wave Antenna for Reception. In the December 1990 column we reviewed Walter J. Schulz, K3OQF's book *Wireless Antenna History: A Vertical Primer*. This book was both a history of early "wireless antennas" and a technical text that delved into details of vertical antenna design, theory, and construction.

Walter has authored another book, *The Wave Antenna for Reception of Medium and Long Waves*. It's a very basic but nevertheless interesting primer on the wave, or Beverage antenna. This antenna's invention is credited to Dr. Harold H. Beverage, in the period just after World War I. It's a directional antenna composed of parallel horizontal conductors one-half to several wavelengths long, and terminated to ground in its characteristic impedance at the far end.

Such directive, relatively low-noise, and easy-to-install antennas still are used by radio amateurs, AM broadcast band DXers, and low-frequency buffs to good advantage. While the Beverage generally isn't for transmitting, it's a good receiving antenna, and many amateurs find it useful for 160 meter work.

While the wave or Beverage antenna has been with us almost since the earliest days of radio, very little information has been available in the radio press, especially details on how the wave antenna and its associated transformers are constructed. Walt's 46-pager, written with the layman in mind, attempts to fill this void in the literature. His book is full of helpful hints, tips, and techniques on making and using a wave antenna.

The book is $12.95 plus shipping and handling from Radio Bookstore, P.O. Box 209, Rindge, NH 03461-0209 (1-800-457-7373). You also can correspond with Walter at P.O. Box 52056, Bustleton Station, Philadelphia, PA 19115 (215-677-7317, ext. 3).

Long Wire Antennas. This new, 53-page book is from noted antenna expert Frank P. Hughes, VE3DQB, and is published by Tiare Publications. It's dedicated primarily to the long-wire antenna and its variants, arguably the most popular basic antenna. The book discusses theory and operation of the long wire and presents numerous types and variations. These include the "V" beam, Beverage, collinear, Windom, bobtail array, and other long wires, including the zig-zag array and VHF long wire. Basic theory, antenna patterns, matching, and antenna placement are discussed. There are some 40 diagrams, plus various charts and tables.

Although we've mentioned them previously, we should note three other highly readable VE3DQB books, also published by Tiare, are popular with amateurs and SWLs. These books are *Hidden Ham Antennas, Limited Space Shortwave Antenna Solutions,* and *Easy Shortwave Antennas*.

In *Hidden Ham Antennas* (50 pages) there's a vast reservoir of ideas, where outdoor, indoor, HF, and VHF/UHF antennas all are discussed—along with ways to disguise them. Also covered are antenna tuners, grounds, and commercial antennas. The focus is on amateur antennas, but SWLs also get some useful suggestions on disguising antennas.

In *Limited Space Shortwave Antenna Solutions* (52 pages) condo and apartment solutions are covered and include randomwire, vertical, dipole, loop, and indoor antennas. Also featured are balcony antennas, window and attic installations, helical dipoles, commercial antennas, and modified CB antennas.

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Here's the very first Zenith Trans-Oceanic portable, the 7G60S Trans-Oceanic Clipper that was produced in late 1941 as the first portable shortwave radio. Note the sailboat design of the speaker grille. This and other Trans-Oceanics are described in The Zenith Trans-Oceanic: The Royalty of Radios, reviewed in this column. (Photo courtesy of Zenith Electronics via John H. Bryant)

Here's Zenith founder Commander E. F. McDonald running final tests on the last unit of prewar Trans-Oceanic production on April 22, 1942. Note the World War II era bomber on the speaker grille. (Photo courtesy of Zenith Electronics via John H. Bryant)

Say You Saw It In CQ

Grounds, wire, insulators, connectors, and masts are discussed.

If you're dissatisfied with the receiving antenna you're using, or if you simply enjoy experimenting, you'll relish *Easy Shortwave Antennas*. This neat collection of more than 50 shortwave antennas (52 pages) covers longwires, slopers, verticals, beams, squares, and indoor and outdoor antennas.

The four Hughes antenna books are each priced at $12.95 plus $2 shipping apiece. They're offered by Tiare Publications, P.O. Box 493, Lake Geneva, WI 53147 (414-248-4845). A "great radio reads" catalog of Tiare and Limelight books is $1.

The Zenith Transoceanic. Did you ever own a Zenith Trans-Oceanic radio, arguably the world's romantic and expensive series of portable radios? I owned a Royal 3000 for several years, and today I wish I had held onto it for a variety of reasons.

In a recent column we reviewed Fine Tuning's *Proceedings*, an exceptional collection of SWL-oriented articles and features. In conjunction with our review, we noted that Professors John H. Bryant and Harold N. Cones recently authored a definitive upcoming book on the Zenith radio classics. It's *The Zenith Trans-Oceanic: The Royalty of Radios*, and it's now available.

On expedition in North Africa's Sahara Desert in 1951, some local residents enjoy a much-cherished "window on the world" with a 1950 Trans-Oceanic Model G500. (Photo courtesy of Zenith Electronics via John H. Bryant)

The new, 160-page 8½" × 11" softcover details the previously untold story of the Zenith Trans-Oceanic. With access to Zenith corporate archives and their long experience as radio enthusiasts and writers for both the popular and the scholarly press, Professors Bryant and Cones present the engrossing stories of the development and use of the radio throughout its 40-year lifespan. They present a wealth of never-before-published documents, high-quality illustrations and photos (see the accompanying photographs), and other authoritative information about these fascinating radios, their collection, preservation, and restoration.

I found the book to be exceptionally well-written, authoritative, and beautifully illustrated and printed on high-quality glossy paper by Schiffer Publishing—a sort of "instant collector's item." Especially interesting (but also tragic) was the chapter detailing "the end of the Trans-Oceanic," when the radio was marketed poorly for several years by the Heath Company (at the time a Zenith subsidiary) through the Heath catalog.

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CIRCLE 32 ON READER SERVICE CARD

At the very end, I learned, the last radios of the line—the solid-state Zenith R7000s—were dumped for about $50 each by several midwestern discount houses. About the only thing I would have liked to be different in the book was the size of the typeface, which was a little small for my tired eyes. I did learn at least one trivia tidbit: the name "Zenith" comes from amateur station 9ZN owned by the operators of a small predecessor radio manufacturing business, Karl Hassel and Ralph Mathews. They called their equipment the "Z-Nith" after the 9ZN callsign.

The book is $24.95 plus $2 shipping and handling by The Radio Professors, P.O. Box 592, Stillwater, OK 74076. (Orders placed with them will get numbered, autographed editions. Make checks or money orders payable to "The Radio Professors.")

Still More from Cygnus-Quasar. In a recent column we took note of the definitive radio astronomy books by Professor John D. Kraus, W8JK, of The Ohio State University, published by Cygnus-Quasar. These include his classic, *Radio Astronomy*, and several other antenna and radio astronomy-related books—*Antennas, Electromagnetics*, and *Big Ear Two*.

One fascinating Kraus book on which we neglected to provide details is *Our Cosmic Universe*. This book is concerned largely with cosmological matters—the study of the structure and origin of the universe. Profusely illustrated, it addresses fascinating topics such as the Big Bang theory; the search for extraterrestrial intelligence (SETI); red giants, white dwarfs, and black holes; cosmic and gamma rays; neutrinos and gravity waves; quasars and pulsars; and efforts to solve some of the big riddles of the universe. The 283-page book is $9.50 in softcover. Though an older (1980) book, it's still in print and current in most respects. *Our Cosmic Universe* is available from Cygnus-Quasar Books, P.O. Box 85, Powell, OH 43065 (614-548-7895).

Computer Books from Macmillan. Sometimes I think that if I hear another word about the "information superhighway" and its main artery, the Internet, I'll scream. Too, if you haven't noticed, the computer sections of your favorite bookstore might well be called the bookstore's "Internet section," for all the books on that subject you can buy.

So if you haven't already heard, what is the Internet? It's a loosely-spun web linking well over 15,000 computer networks in more than 50 countries, from mainframes to desktops. With 25+ million users worldwide (no one knows the real number, which may be much larger), it's the fastest growing online resource.

Designed originally for research by the government and educational institutions, it's not inherently user-friendly. But that's changing as more users seek access. You may be able to hook up through work or school, online communications utility services, bulletin board systems (BBSes), and access providers who connect you for a fee. Anyone with a personal computer and a modem today can benefit from the resources of the Internet, if they're willing to put up with a little work in setting up.

Sometimes it's not so easy to hook up with the Internet, especially if you're doing it strictly on your own, so lots of software and book publishers have jumped in to fill that void. One of them is Macmillan Computer Publishing, which publishes titles under a number of imprints (Que, Sams Publishing, New Riders Publishing, Hayden Books, Alpha Books, and others).

Several good, mostly jargon-free Macmillan books on the Internet and the information superhighway have crossed my desk recently. I'll share the titles with you. These include *Straight Talk About the Information Superhighway*, by Reid Goldsborough (340 pp., Alpha Books, $19.99); *Curious About the Internet?* by Ned Snell (247 pp., Sams, $14.99); and *Get on the Internet in 5 Minutes* by Brad Miser (86 pp., Hayden Books, $9.99).

Turning to CD-ROM books, I'll bet that the new PC you just bought includes a CD-ROM drive, right? Responding to the surge of PCs equipped with these mega-platters, computer book publishers are cranking out CD-ROM "how-to" books left and right, and many "book/disk" combo packages are substituting a jam-packed CD-ROM disc for a skimpy 3.5 or 5.25 inch diskette.

One very interesting new Macmillan title is *Super CD-ROM Madness!* by Lee Purcell. The 481-page Sams book/CD-ROM combo is a guided tour of technology, software applications, and hardware that explores how you can get the most from your CD-ROM drive. It includes two byte-stuffed CD-ROMs that contain numerous sample programs, interactive demos, utilities, and more—including an excellent demo of the $1300 *McGraw-Hill Multimedia Encyclopedia of Science and Technology*. The combo is $39.99.

Contact Macmillan Computer Publishing, 201 W. 103rd St., Indianapolis, IN 46290 (1-800-858-7674).

Antenna Notes

Quick Tune Label Sets. Recently, Taylor Davidson, N4TD, told me of an innovative product. He offers the Quick Tune (QT-1) Label Sets, a professional-looking labeling system for indicating amplifier and antenna tuner presets.

Taylor says the idea for them came to mind when he purchased a new linear amplifier last year. He was trying to come up with a good way to mark the tune and load controls so he could quickly pre-tune for the various bands. After thinking about various alternatives, the idea hit him that he could design labels to identify amplifier or antenna tuner tuning positions that would not only work but would look good and be convenient to use.

The QT-1 Label Sets were the result. With each set, several types of labels are included. There are "arrow" labels that mark positions for dial pointers. For the lower frequency bands, versions of the arrows with an "H" or an "L" after the band number mark tuning for the high and low ends of the band. For equipment with panel space limitations or an incompatible dial, the tuning chart may be used. Two charts are provided, one for amplifiers and one for antenna tuners. Additional labels provide for labeling antenna switches and amplifier current ratings.

The QT-1 labels are fabricated from 5-mil polycarbonate for durability. A "peelable" adhesive is used to allow for later removal and to help prevent surface damage if the labels are removed or relocated. The labels may be trimmed with scissors.

The sets are $12.95 each plus $1.50 shipping and handling from Tango Delta Enterprises, P.O. Box 30506, Knoxville, TN 37930-0506. (Send Taylor a QSL or postcard for more information.)

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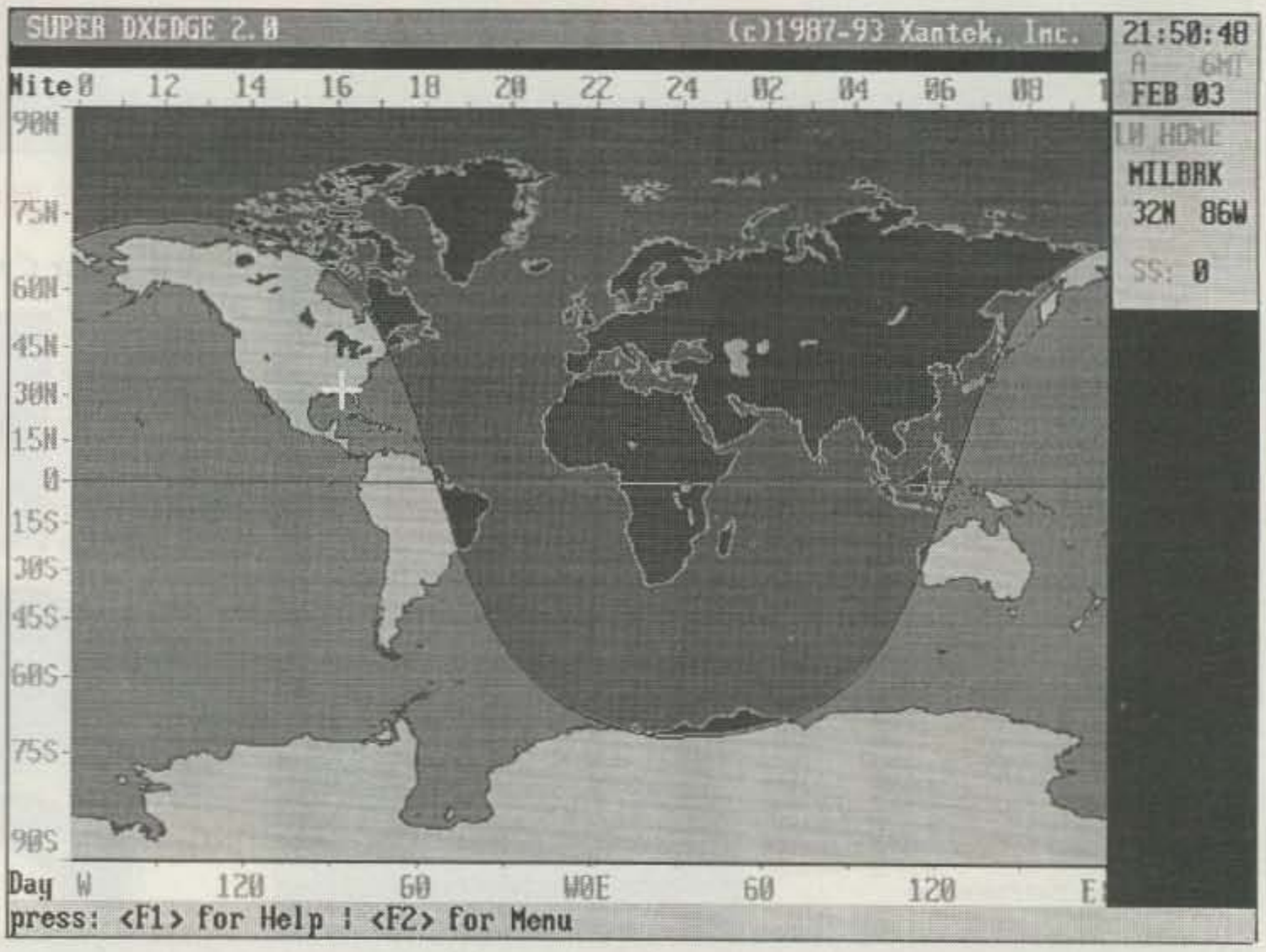

Fig. 1– The Super DX EDGE V2.0 is used to determine optimum DX contact timing, especially the best times and bands for long-path and gray-line communications, and for estimating when both ends of the contact will be in darkness (for the lower frequency bands) and when the two points will be in daylight (for the higher frequency bands). It's offered by Xantek, Inc.

Tower Jack. Amateurs have used everything from scissor jacks to 2×4's to disassemble their tower sections, with varying degrees of ease and success. One very useful new product to help you disassemble your tower is Tower Jack.

Designed especially to dismantle Rohn Models 20, 25, 45, and 55 tower sections, its goal is to ease the back-breaking work involved in uncoupling tower sections that have stood exposed to the weather for several years. The unit is a sort of lever that gives you a "mechanical advantage" in uncoupling the sections.

Tower Jack is $44.50, including UPS shipping. More information is available from Tower Jack, P.O. Box 82321, Baton Rouge, LA 70884-2321 (504-924-7708).

Postscript: The installation and dismantling of towers both are inherently dangerous operations. Many serious, even fatal accidents have occurred because people assumed that situations were safe when in fact they were not. Tower dismantling can be more dangerous than installation, since the condition of the tower, guys, anchors, or roof may be unknown.

There are three tower safety watchwords you should follow. First, don't take unnecessary chances when climbing a tower; second, quit climbing if things aren't going well; and third, read and follow all safety precautions when working with towers. The Tower Jack folks remind purchasers to exercise the utmost caution when working on your tower, and to wear safety belts when climbing them. They can't be held responsible for accidents or other incidents involved in the improper use of their product.

ToolPak™ Goodies. In previous columns we mentioned that when installing, servicing, or removing a tower, ready access to your tools is important. It seems that tower climbers never have enough pockets for bolts, tools, and other parts when working, and often they can benefit from a variety of "climbing accessories" such as canvas buckets or tool pouches, extra snap hooks, lanyards, safety lines, and the like.

Some products we mentioned in previous columns include the Tower-Mate Accessory Patch, also known as the "Big Pocket." It features Velcro fasteners that attach the pocket to the inside of the tower, creating a place for tools, bolts, and other parts. As we noted, it's available in several versions from Tower-Mate, P.O. Box 601616, Sacramento, CA 95860-1616 (FAX 916-481-5381). Climbing-belt accessory tool pouches are offered by ONV Safety Belt Co., P.O. Box 404, Ramsey, NJ 07446 (1-800-345-5634).

Now there are more options. A variety of ToolPak tool vests, accessory packs, totes, "fanny" tool packs, duffels, and similar accessories are offered by PAKTEK as "something for the person who has everything and needs to organize it."

One of the most useful of the innovative packs shown in their flyer appears to be the new nylon Tool Vest, priced at $54.97. It has 14 easy-access pockets, six flap-covered pockets, and a zippered neck opening and nylon mesh back. Their Fanny Pak, at $24.97, is creatively billed as the "hip way to carry your tools," and it features a fold-out panel and three internal compartments. Their large Original ToolPak, at $89.97, claims that with it, you "buy one, get two hands free." It lets you organize over 100 tools in pockets, slots, and zippered compartments so you can carry them more conveniently.

For more information, contact PAKTEK,

7307 82nd St. Ct. SW, Tacoma, WA 98498 (1-800-258-8458).

COMTELCO Update. In December 1992 we took note of the surprisingly complete line of American-made mobile and base-station antennas offered by COMTELCO Industries, Inc. The firm has been in business since the late 1970s and is a major supplier of commercial communications products.

The 1995 COMTELCO amateur products catalog shows several antenna lines for amateur VHF and UHF use. The mobile antennas are available with through-hole, trunk-lip, and magnet mounts. The antenna series offered include interchangeable "multi-whip" quarter-wave models, for single-band operation on any one of three separate bands (144, 220, or 440 MHz); several dual-band (144/440 MHz) models; two series of 440 MHz "gain antennas"; single-band, base-loaded models covering from 28–450 MHz; and commercial-quality CB antennas.

Fixed-station antennas include fiberglass "minibase" models for 440 and 902 MHz, and five-element Yagis for 144, 220, 440, and 902 MHz. COMTELCO also offers commercial-quality mobile mounts and accessories, including a 140/440 MHz duplexer, a shock spring, replacement whips, adapters, and a battery-tap device.

For a catalog, contact COMTELCO Industries, Inc., 501 Mitchell Rd., Glendale Heights, IL 60139 (1-800-634-4622).

Max-Gain Systems Update. In the January column we focused on the fiberglass products offered by R. Allen Bond, WB4GNT, through Max-Gain Systems. Max-Gain is a source of a wide range of fiberglass products suitable for radio amateur use. They stock a complete line of solid-rod, round-tube, and square-tube fiberglass for antenna construction and other hobby purposes. They also sell several types of fiberglass quad spreaders.

Recently, Allen advised me that since I last corresponded with him, he's developed and tested three new spreader types. These are the Type 1-L, for intermediate-duty use to 20 meters; the Type 5, for light- to intermediate-duty use to 40 meters; and the Type 6, for heavy-duty use to 40 meters. The Type 6 spreader is a joint development with Antenna Mart and, to his knowledge, is the first heavy-duty, UPS-shippable 40 meter spreader.

Max-Gain's product development includes a tough torture test, in which the spreaders are mounted in a quad spider and the tip is subjected to enough weight to bend the spreader 180 degrees. Allen feels that if the spreader survives this test, it meets his personal "survivability spec." But he cautions strongly that you should not try this test yourself, as it can be physically dangerous!

Allen also sent me a sample of his 1½ inch O.D. tube and 1¼ inch solid rod stock. I found these to be a nice, extremely strong combination for crossbooms and masts. The two can be made one unit by pinning with machine screws or (preferably) with 50/50 epoxy. Allen recommends painting as suggested in his "Max-Tips" notes (included in Max-Gain product literature) and wrapping with an outer surface wrap of aluminum flashing and epoxy at points of friction, such as where the stock goes through a rotor or tower top. (Antennas should be "pinned" so they can't twist on the mast or crossboom in the wind.)

For a fiberglass stock price list, details on

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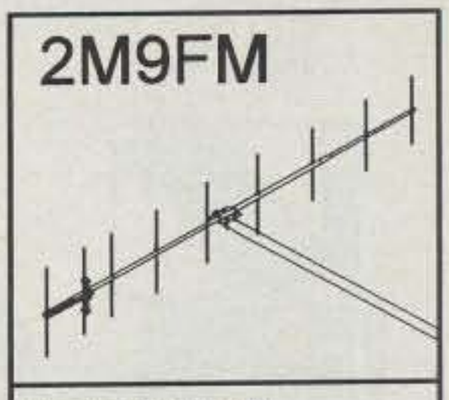

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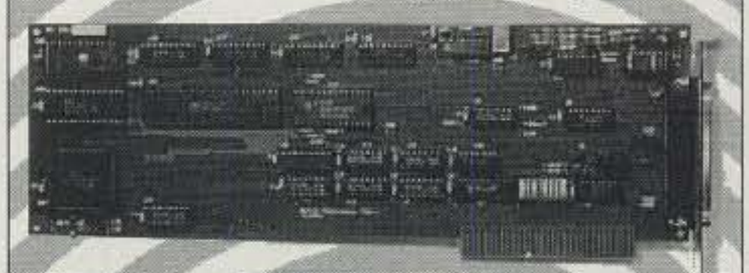

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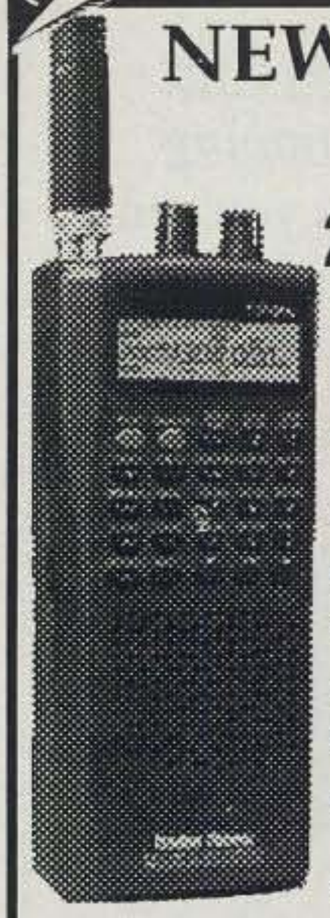

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                          GRAY LINE REPORT

ON:  FEB 03
BASE:  MILBRK                                          ( 32N,  86W )
                    Rise                    Set
                   12:36                   23:19                GMT

Hits
UI                          ( 40N,  64E )   Set  during Base's Rise 13:04
UJ                          ( 39N,  69E )   Set  during Base's Rise 12:46
UK                          ( 40N,  64E )   Set  during Base's Rise 13:04
UL                          ( 43N,  77E )   Set  during Base's Rise 12:06
UM                          ( 43N,  75E )   Set  during Base's Rise 12:14
UN                          ( 43N,  77E )   Set  during Base's Rise 12:06
VK0H                        ( 53S,  73E )   Rise during Base's Set  23:41
VK9C                        ( 12S,  97E )   Rise during Base's Set  23:27
VK9X                        ( 10S, 106E )   Rise during Base's Set  22:54
VR2                         ( 22N, 114E )   Rise during Base's Set  23:01
VS6                         ( 22N, 114E )   Rise during Base's Set  23:01

To show more hits                                          (press <SPACE>)
```

Fig. 2– The Super DX EDGE V2.0 gray-line report lists in real-time countries on the gray line at any time of the day. You can do a gray line for any day of the year; standard curves are on file for quick recall. You also can customize the Super DX EDGE for your location and some other options and parameters.

```
SUPER DXEDGE 2.0                                   (c)1987-93 Xantek, Inc.

                          MUF REPORT

ON: FEB 03                  SUNSPOT : 40N                  MUF in MHZ

TRANSMITTER:  MILBRK                                   ( 32N,  86W )
RECEIVER:     VK3                                      ( 38S, 145E )

 GMT    MUF        GMT    MUF        GMT    MUF
0000   31.9       0800   15.5       1600   17.9
0100   28.8       0900   14.8       1700   16.7
0200   24.2       1000   14.2       1800   17.3
0300   22.1       1100   13.7       1900   21.1
0400   20.3       1200   13.3       2000   24.2
0500   18.7       1300   18.4       2100   26.7
0600   17.5       1400   20.9       2200   28.7
0700   16.4       1500   19.3       2300   30.5

press <SPACE> to continue                          (press <SPACE>)
```

Fig. 3– The Super DX EDGE calculates maximum usable frequency (MUF) and computes great-circle bearings (antenna directions) and distance between any two locations. The program includes a built-in file of country names and amateur radio prefixes, making it easy to identify and pinpoint any location for marking it on the displayed map or for making calculations.

spreaders, and some useful application notes, contact Max-Gain Systems, Inc., 221 Greencrest Court, Marietta, GA 30068-3825 (404-973-6251).

Computer and Software Notes

Xantek Super DX EDGE V2.0. Computer-based propagation prediction programs, with their reliance on proven propagation algorithms and access to near-real time data, have much to offer the aggressive DXer and contest operator. There are several good propagation programs that you can use to supplement the band-opening predictions in the propagation charts that appear in my colleague George

Jacobs, W3ASK's *CQ* "Propagation" column.

In past columns we have described or reviewed several commercial propagation programs, including Ham Companion™, MINIPROP Plus™, IONSOUND PRO™, CAPMAN, ASAPS, SKYCOM, and several others. One of these programs is the Super DX EDGE, which we first noted in several late 1980s columns, shortly after it came out in an IBM PC version (it previously was available for the Commodore 64 computer).

Super DX EDGE, offered by Tony Japha, N2UN, though Xantek, Inc., is particularly useful in that it incorporates a gray-line capability. The program calculates maximum usable frequency (MUF) and computes great-circle bearings (antenna directions) and distance between any two locations. In addition, the program is able to display and automatically update the position of the gray line.

The Super DX EDGE determines optimum DX contact timing, especially the best times and bands for long-path and gray-line communications, and for estimating when both ends of the contact will be in darkness (for the lower frequency bands) and when the two points will be in daylight (for the higher frequency bands). Many users have found gray-line calculation capability quite important, since especially good propagation often occurs during times of sunrise and sunset.

The enhanced Super DX EDGE V2.0 offers accurate graphic presentations of sunrise and sunset times, as well as daylight and darkness areas of the world for any time of the year and at any time of day. It includes a close-up (zoom) feature to look at a small portion of the world in more detail. The program lets you shift the gray line (terminator) to keep a current picture of the world on the monitor screen, and it also offers you the option of keeping time linked to the curve position in any of the world's time

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FT-900AT New HF Mobile	$50 OFF	1699.00	Call $
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✓ **C558A** 2M/440MHz	689	Call $
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Fig. 4– Shown here is page one of the main menu of RFDC V2.0. It's a comprehensive radio-electronic and RF design program that features many functions that facilitate the design and evaluation of a variety of inductors and antennas. Numerous enhancements have been made to the program since we highlighted V1.0 in the April 1993 column, most notably the addition of the SmithWorks option. (See the text of this column for details.)

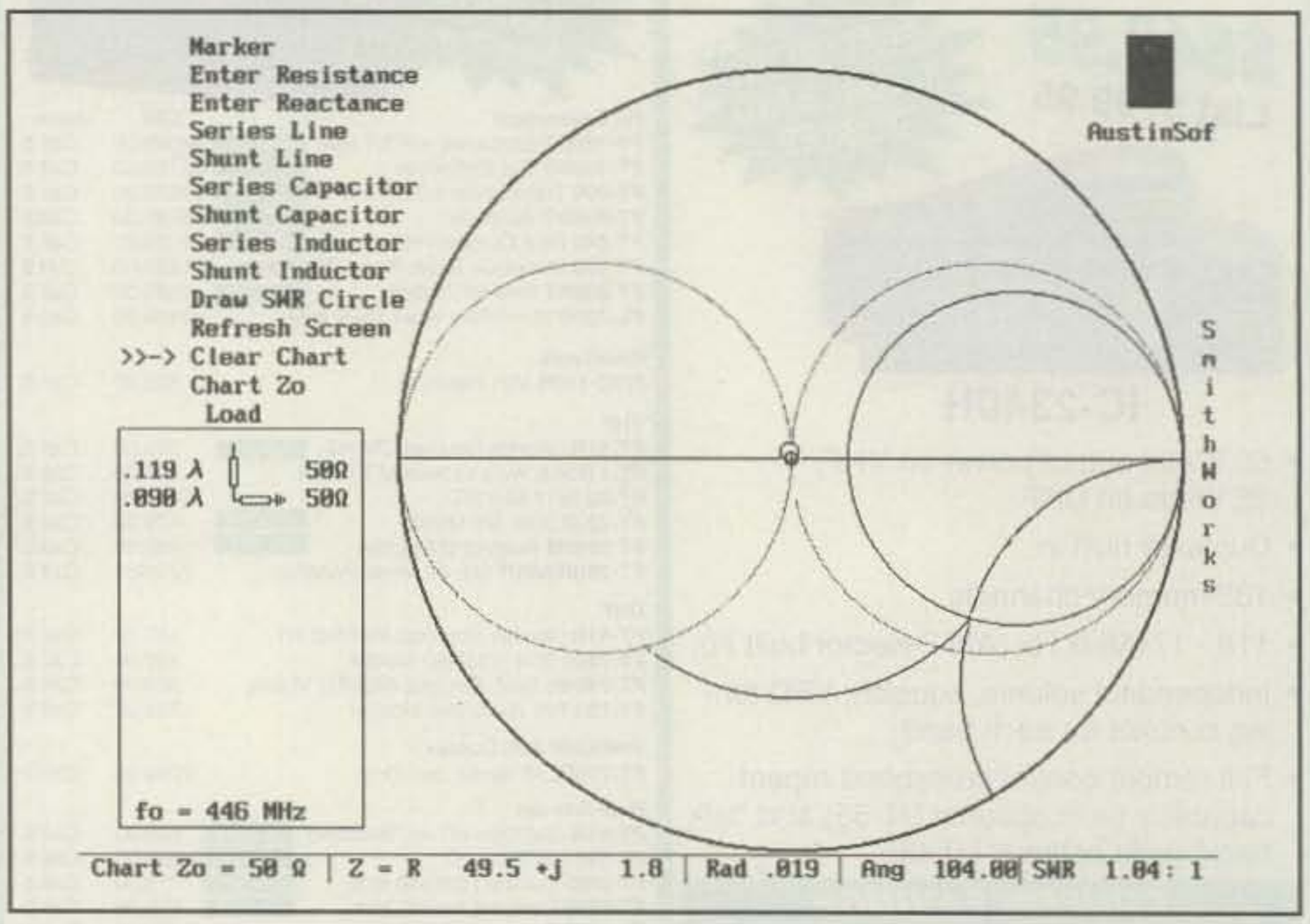

Fig. 5– One of the best features of RFDC V2.0 is the optional addition of SmithWorks. This is a Smith chart that can be understood and used by practically anyone with a bare minimum of electronics expertise. There are other Smith chart software programs around, but most require a tedious trial-and-error approach. The "Series Line Zoom" feature eliminates this confusion, and it minimizes the confusing lines, circles, and "electronic hieroglyphics" found on most Smith charts.

zones (see figs. 1, 2, and 3).

The program includes a built-in file of country names and amateur radio prefixes, making it easy to identify and pinpoint any location for marking it on the displayed map or for making MUF and great-circle bearing calculations. You can customize the program for your location and some other options and parameters.

The Super DX EDGE V2.0 is $29.95 from major radio dealers and bookstores, including Radio Bookstore. For more information, contact Xantek, Inc., P.O. Box 834, Madison Square Station, New York, NY 10159 (212-673-7646).

Postscript: A color slide-rule (non-computer) version of the DX EDGE also is available. The color DX aid, which we described in the December 1994 column, replaces the black-and-white version that's been around since being introduced in 1981. The new edition includes a double map of the world and 12 slides, one for each month. The shape of the gray line—the line that separates daylight and darkness—changes throughout the year, and each slide shows the gray line for that month. It's $24.95.

RFDC V2.0. Dick Austin, K1QIZ, well known

in antenna manufacturing circles as the proprietor of Austin Antenna Ltd., some time ago began offering radio-electronic circuit and RF calculation software. One of these programs is RFDC, or R.F. Designs & Calculations software. We reviewed it in the April 1993 column along with dB Comp, a predecessor program of RFDC that's now merged into RFDC.

We noted then that RFDC was an extensive design program with numerous calculation functions. The program facilitates the design of many inductors, including self-resonant, flat-strip, and round wire inductors. Coaxial line capacitors, inductors, and chokes are covered also, and the software "designs to" a known inductance or LC resonance.

The program also computes parameters for short loaded dipoles and dual-band trap dipoles, and it performs antenna-element frequency scaling calculations. An extensive "shop tools" section includes wire-gauge tables, dielectric constants, drill sizes, metric-unit conversions, and wind-load calculations.

Recently, Dick added many new features and capabilities in RFDC V2.0 (see fig. 4). These include the ability to calculate inductor "Q" and optimize inductor parameters, compute reactance ratios, calculate complex numbers, design ferrite and powered iron toroid inductors, and design microstrip components. The shop screen also has been expanded to provide more reference material, including metal gauges and aluminum tubing sizes.

The big news is an optional addition to RFDC, SmithWorks. This is a computer version of the normally difficult to use Smith chart that can be understood and used by practically anyone with a bare minimum of electronics expertise.

The Smith chart is an inherently powerful engineering tool for the solution of transmission line and waveguide problems, but it's only available to those who are willing to invest considerable effort in learning its intricacies. There are some other Smith chart software programs around, but most of these require a tedious trial-and-error approach. The "Series Line Zoom" feature of SmithWorks eliminates this confusion. This feature minimizes the confusing lines, circles, and "electronic hieroglyphics" found on most Smith charts (see fig. 5).

RFDC V2.0 is $45. The SmithWorks option is $50, and both together are $85. Upgrades from RFDC V1.0 also are available. The programs are from Austin Antenna Ltd., 10 Main St., Gonic NH 03839 (603-335-6339). (See our December 1993 "Antennas and Accessories" column for a discussion of other commercially available Smith chart programs.)

Looking Back Five

Five Years Ago in Antennas and Accessories. Now you know what the column looks like in August 1995. But what did it consist of in August 1990? Coincidentally, we featured books in that column; "Books and More" was the title.

We devoted almost all of the August 1990 column to examining new book titles in the areas of amateur radio, electronics, satellite communications, computers, and software. Among others, we peeked at the ARRL's *Antenna Compendium*, Vol. 2, with its companion software diskette; Donald W. Matteson's treatise *The Auto Radio: A Romantic Genealogy*; Jim Dux, K3JD's and Mort Keyser, N3MK's *Talk to the World*; Tom Kneitel, K2AES's *AirScan Guide to Aeronautical Communications*; Bill Cheek's *Scanner Modification Handbook*; *Dvorak's Guide to PC Telecommunications*, by John C. Dvorak; and several books on using dBASE®, MS-DOS, and PC-DOS, featuring then-new MS-DOS 4.x.

We also examined some software. We looked at an interesting computer-assisted instruction (CAI) program, Aristotle, the Artificial Teacher, by Dr. Albert P. Malvino; CheckIt®, a PC diagnostic program from TouchStone Software; The Brooklyn Bridge™ file transfer program from Fifth Generation Systems; and The StarMouse™ wordprocessing utility.

If you find a topic we covered in this or a previous column of interest, please obtain the back issue directly from *CQ*'s New York office, rather than requesting the article from us. Most back issues are available from *CQ* for $3.50 postpaid. (*CQ* also offers various "back issues specials" to complete your collection. Check their ad in this issue, or call them at 1-800-853-9797 to order back issues.)

Wrap-Up

That's all for this time, gang. Next time more Antennas and Accessories topics of current interest. See you then.

Overheard: Warranties? Your greatly prized 90-day warranty practically guarantees that the product will self-destruct on the 91st day of your ownership.

73, Karl, W8FX

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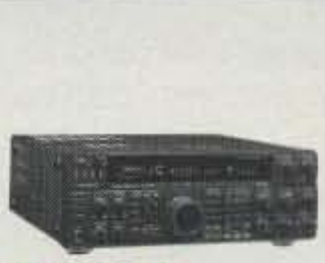

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MATH'S NOTES

BY IRWIN MATH, WA2NDM

WHAT'S NEW AND HOW TO USE IT

Easy-to-Implement, General-Purpose Audio Amplifiers

National Semiconductor recently introduced two audio amplifiers that will be of interest to experimenters needing simple 3 to 5 volt powered devices. The units are part of their new "Boomer" series and were originally designed for use in cellular telephones, toys, and portable consumer products, and toys. Both use a minimum number of external components, offer significant output power levels and are only available in surface-mount packages. This results in their only needing minimal PC board space, making them ideal for use in HTs and other small, low-powered portable devices.

The first amplifier, the LM4861, is an 8-pin chip that delivers up to ½ watt of output power to an 8 ohm load with a maximum THD (distortion) of 1%. The unit is unity gain stable, although it can be configured for differential gains of up to 20. Furthermore, no external output capacitor or snubber networks such as those needed by the LM386 are required. Current drain is only 10 ma maximum with no input signal. However, the unit has a shutdown input that can reduce this to 0.6 ma if necessary. This feature is important if you are using it in battery-powered applications. While the full specification operating temperature range extends from –20° to +85° C, no heat-sinking of the chip up to 44° C (about 110° F) is necessary, so both typical indoor and outdoor ambient operating environments can easily be accommodated.

Fig. 1 is the schematic diagram of an audio amplifier using the LM4861. Output to the 8 ohm speaker is a full ½ watt and differential voltage is 20. Construction is straightforward, with the only consideration being that the bypass capacitors on pins 3 and 6 be as close to the device as possible to prevent unwanted oscillations. With the values shown in fig. 1 the resulting audio bandwidth will be from 20 Hz to 20 kHz ±0.25 dB. To reduce the frequency response to the normal communications voice band of 300 to 3.5 kHz, change Rf to 510K, Ci to 0.22 µF, and Cf to 15 pF.

The LM4861, as previously mentioned, has a shutdown feature that is controlled by the voltage at pin 1. If this pin is connected to ground, the amplifier is enabled and operates in the normal manner. When pin 1 is connected to Vcc, the amplifier immediately turns off, disconnecting the speaker and reducing the power supply current drain to approximately 0.6 microamperes. This shutdown function can therefore be used as the basis of a unique squelch control which will allow almost no current drain while not receiving audio, a

c/o CQ magazine

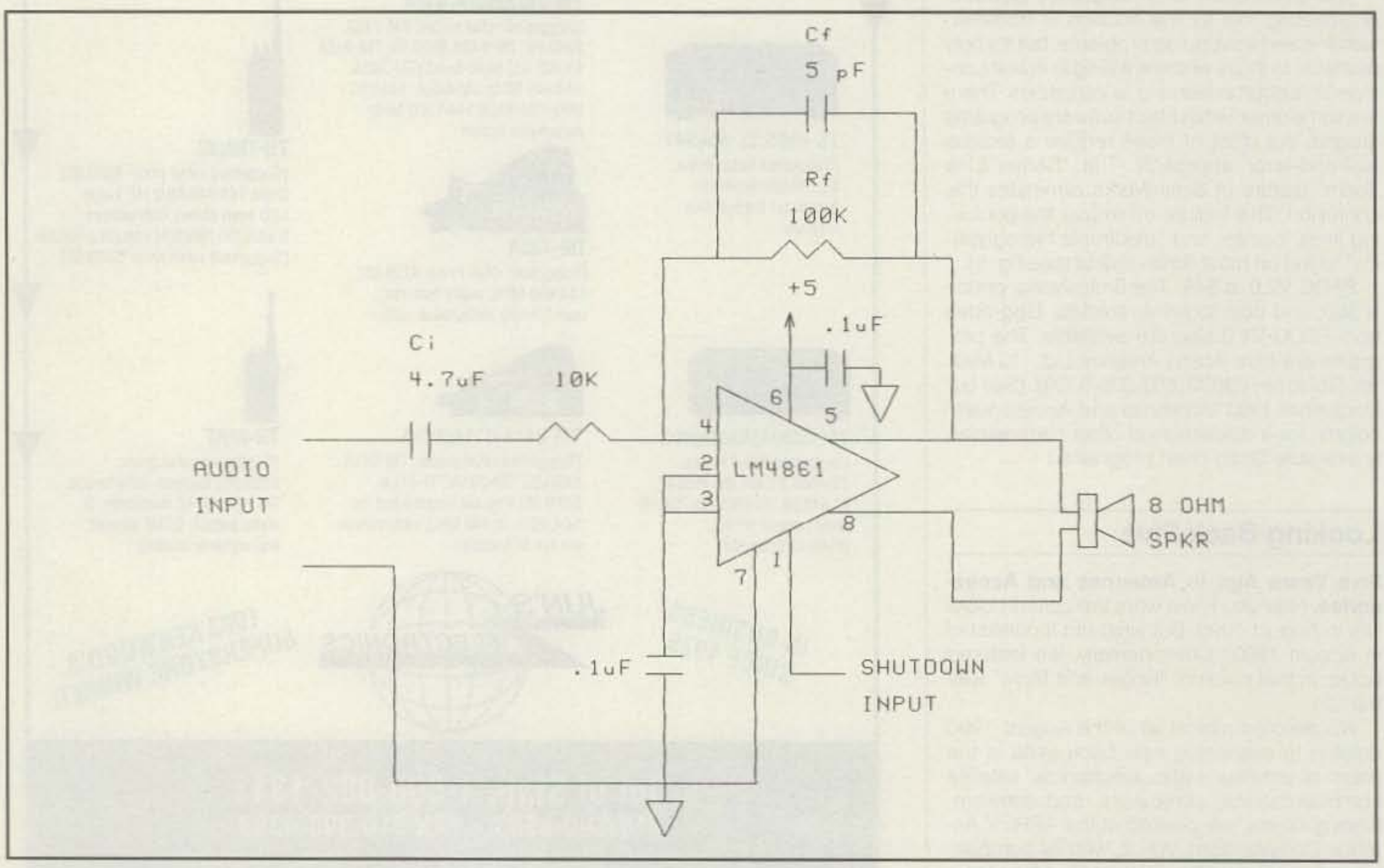

Fig. 1– A one-half watt audio amplifier using the LM4861. (See text for component changes to alter frequency response.)

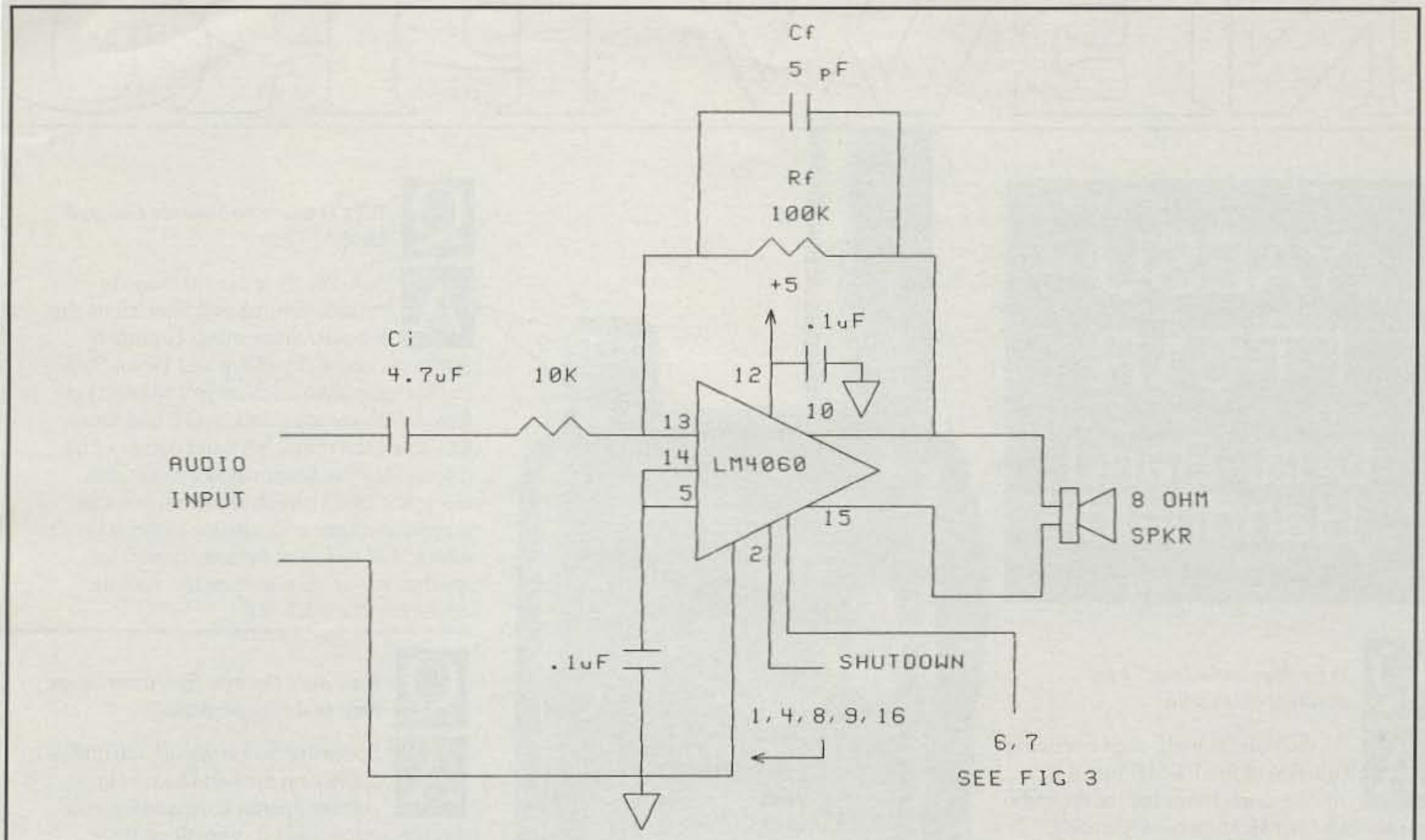

Fig. 2– A 1 watt audio amplifier using the LM4860. (See text for component changes to alter frequency response.)

feature that is quite welcome when designing and building battery-powered equipment.

The second amplifier in the family, the LM4860, is a 16-pin, surface-mount device providing 1 watt of output power with a total distortion of 1% as well. Like the LM4861, the chip operates from –20 to +85 degrees C, requires no heat-sinking anywhere within this range, operates from a 3 to 5 volt supply, and does not require snubber networks or large output coupling capacitors. The basic circuit is shown in fig. 2 and is quite similar to that of fig. 1. To reduce the audio bandwidth to the voice-band frequency range, you can use the same values as those called out for fig. 1.

The LM4860 draws 15 ma maximum with no audio input unless the shutdown feature is used, at which time the current drain drops to 0.6 microamperes. Also provided is a so-called "headphone control" input and output which can be used to configure various types of external control circuits. This input is really an OR gate and its relation to the rest of the chip is shown in fig. 3. How to use this is left to your ingenuity. Although an 8 ohm load is indicated in the application drawings, both amplifier chips will drive loads as low as 4 ohms (at about 50% more power) and as high as 40 to 70 ohms at reduced power.

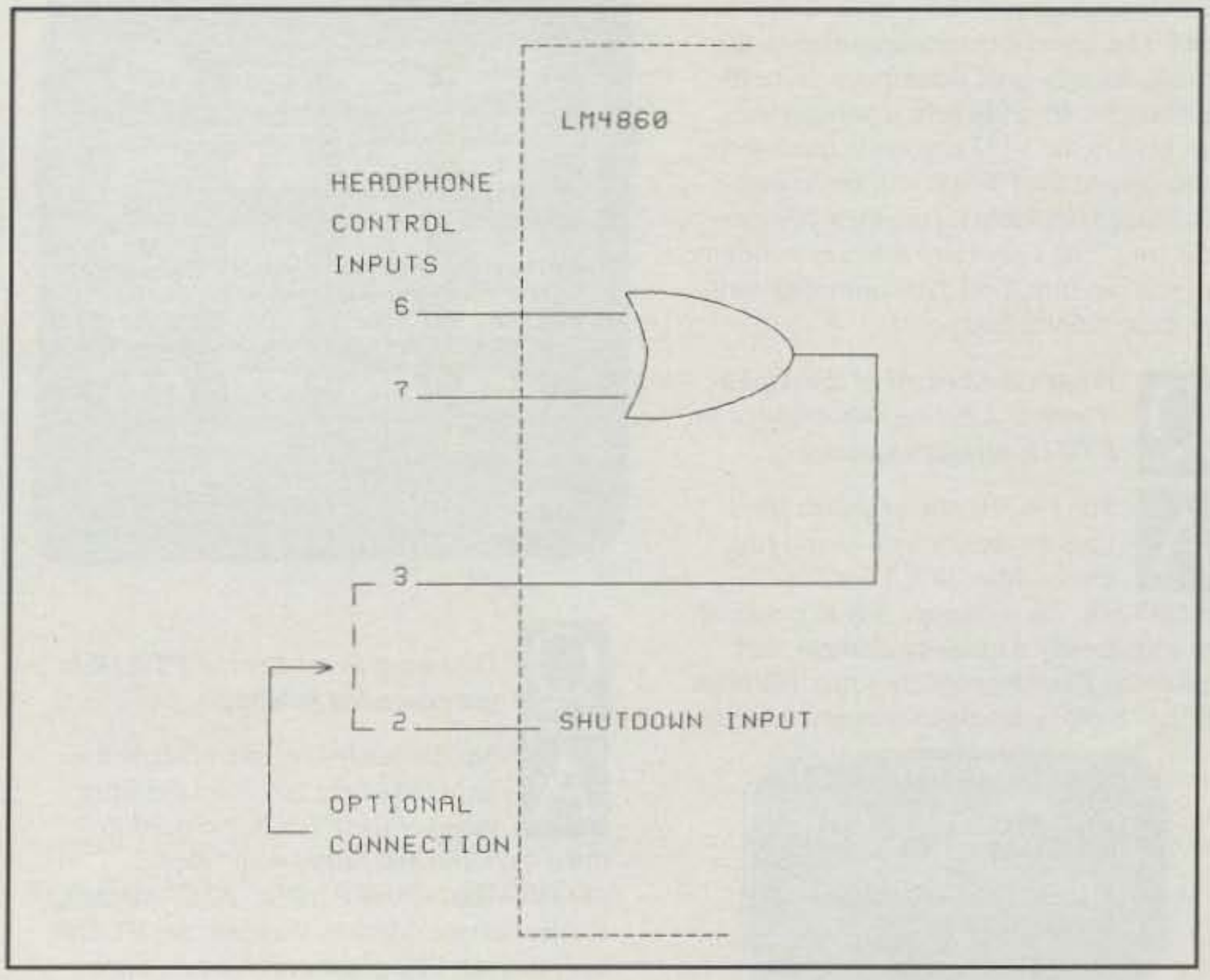

Fig. 3– Use of headphone control.

For futher information on either or both chips contact National Semiconductor at 2900 Semiconductor Drive, P.O. Box 58090, Santa Clara, CA 95052-8090 or your local National Semiconductor distributor. Please let me know of your experience with these devices if you do plan to use them.

73, Irwin, WA2NDM

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YAESU FT-51R Dual-Band Handheld

Q ***Why does "windows" best describe this radio?***

A As the radio is used, each operating function of the FT-51R menu is shown in the lower part of the radio display in a User Help menu. Operating information for a particular function automatically scrolls across the display in a continuous sentence string much like it does on a computer, thus the term "windows" seemed analogous to the familiar computer term. The User Help message displays the setting, name, a brief description and exit instructions. It's a big help if you get lost. Just hold in the VFO key while turning the radio on and the FT-51R will revert to the automatic User Help menu, then you can start over. The User Help menu is automatic, but you can turn it off. No competitor radio has these helpful functions!

Q ***What's the benefit of the Alpha-Numeric labeling capability in the FT-51R memory system?***

A The FT-51R allows you to label your memories with identifying names, like "WX-1" or "SIMPLEX." It's a creative way to personalize and identify a memory channel, and makes the FT-51R uniquely yours. No other HT has 8-character alpha-numeric labeling.

Q ***Do I have to modify the FT-51R to get expanded receive?***

A No! Expanded receive is accessible right out of the box from the front panel of the FT-51R. No need to open the radio and tinker with "mods." 110-180 MHz, 420-470 MHz; "AM" Aircraft, Public Service, Marine, Weather; the FT-51R operates just like a scanner. Further, since the FT-51R has an "Auto Mute" feature, which gives the "Main" channel priority, you can monitor the weather channel on VHF without missing a call on UHF.

Q ***Why is there no Volume Control knob?***

A Actually there are two ways to control Volume and Squelch on the FT-51R. Since many customers prefer the simplicity of Up and Down Push Button volume/squelch control to avoid confusion with the top panel, you'll find them just above the upper left hand corner of the display. They're illuminated at night, too, along with the keypad. However, you can program volume and squelch to the main tuning dial on top of the transceiver. Just another way to demonstrate the versatile operation of the FT-51R.

Q ***How does the new Spectrum Scope help in daily operation?***

A Spectrum Scope visually identifies activity on the band near your current operating frequency, and displays relative signal strength on three channels below, and on four channels above. The total frequency spread depends on what channel steps – 5 kHz, 10 kHz, etc. – have been selected. In the Memory mode, Spectrum Scope shows activity on the current memory channel plus the three memories below and four memories above, in numerical order. And, it doesn't matter if you're working V/V, U/U or V&U. The flexible Spectrum Scope can be used manually or automatically. Find new frequencies faster with Yaesu's exclusive Spectrum Scope.

Q ***Is the FT-51R really the smartest dual-band radio with the largest keypad?***

A Yes! The keypad on the FT-51R was designed for fast, accurate operation, with special care given to the size of the keys and keypad spacing. Operation of the FT-51R is easy and unerring because the keys were shaped precisely for optimum fingerpad contact, and spaced to prevent accidental depression of adjacent keys. The FT-51R is fourth generation in both dual band HT technology, and electronic miniaturization. Since Yaesu pioneered these engineering areas, they were able to even further reduce the radio size, permitting expansion of the critical keypad area.

These are just some of the most commonly asked questions Yaesu has received since the introduction of the unique FT-51R. For more information, a complete "Question & Answer" Guide is yours for the asking. Just write, FT-51R "Q&A," Yaesu U.S.A., 17210 Edwards Rd., Cerritos, CA 90703, or call (310) 404-2700 Ext. 228.

PRODUCT Q&A

Q ***Does the FT-51R display current battery voltage?***

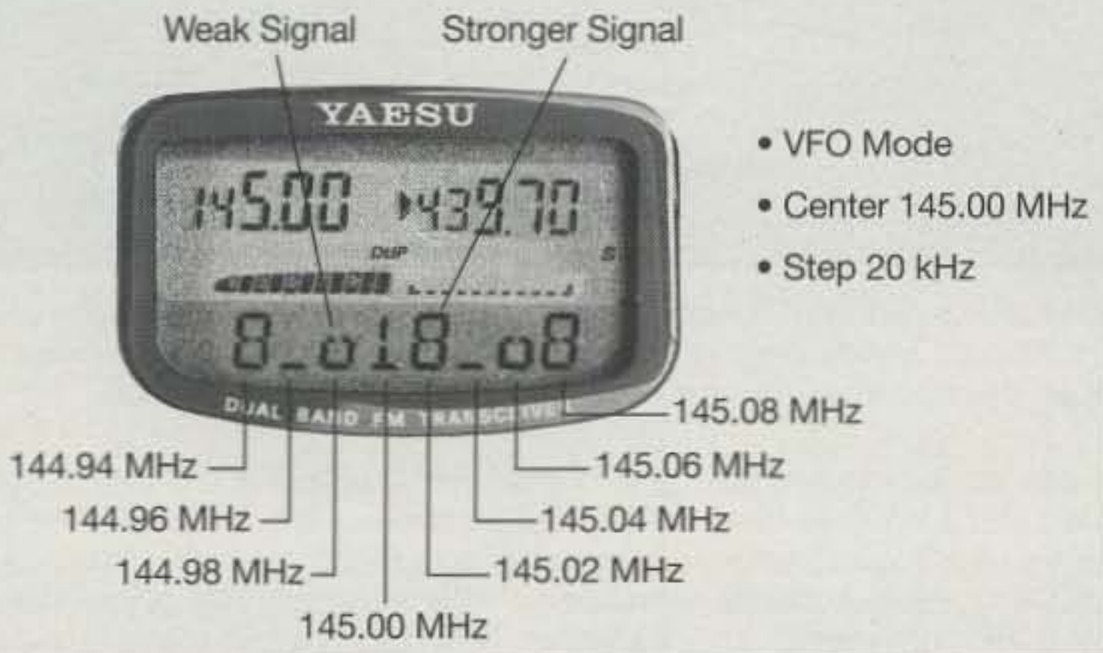
A Actual battery voltage can be monitored at any time in the bottom half of the FT-51R display "window".

alerting you to any necessary re-charge requirement. This is a great feature, and not one found on any other radio. For example, when using the FNB-31 battery the display will show "4.8" as your current battery voltage.

Q ***What are my choices to power-up the FT-51R during mobile operation?***

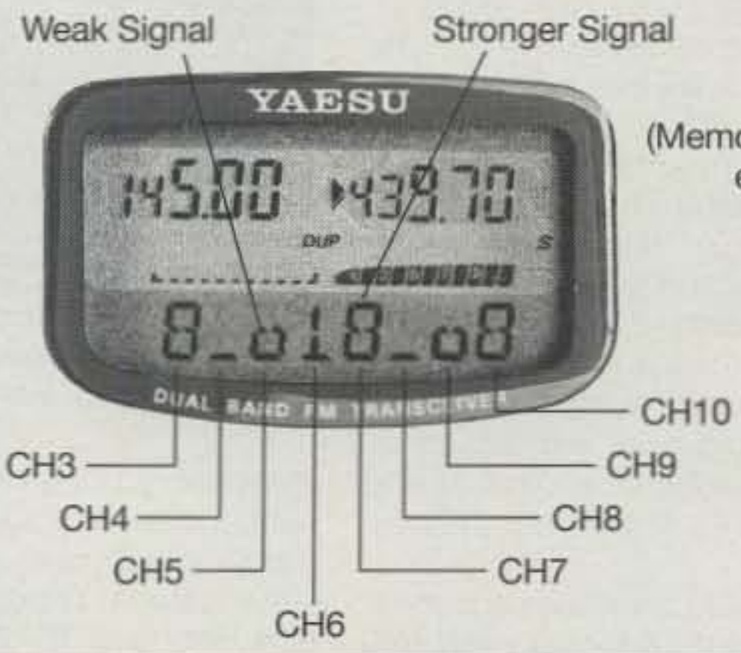
A Yaesu gives you three adapter options including the new E-DC-12 Mobile DC Adapter which slides on the bottom of the HT. The E-DC-12 provides direct DC power, and trickle charges the battery simultaneously.

Spectrum Scope Display Indication 1



- VFO Mode
- Center 145.00 MHz
- Step 20 kHz

Spectrum Scope Display Indication 2



(Memory Mode/Center CH6)
ex. CH3: 433.02 MHz
CH4: 433.06 MHz
CH5: 145.00 MHz
CH6: 433.00 MHz
CH7: 145.10 MHz
CH8: 145.14 MHz
CH9: 433.10 MHz
CH10: 439.70 MHz

Q ***Is the FT-51R the first PC programmable dual-band HT?***

A Yes, the FT-51R is programmable with the optional Advanced Data Management System (ADMS-1) for Windows™ software. Specifically, you can program (or clone) all information including frequencies, alpha-numeric names, etc. in about 3 seconds. The FT-51R is the only HT which permits you to access your pre-programmed files of repeaters in any city where you may travel.

Options

Rechargeable Battery Packs
- FNB-31 Ni-Cd 4.8V, 600 mAh (1.5 Watt)
- FNB-33 Ni-Cd 4.8V, 1200 mAh (1.5 Watt)
- FNB-38 Ni-Cd 9.6V, 600 mAh (5 Watt)

Dry Cell Battery Case
- FBA-14 4 x AA Size (1.5 Watt)

Mobile Rapid Charger
- CD-2 (for charging use only)

DC Power Adapters
- E-DC-12 Mobile DC Power Adapter (w/ Trickle Charge)
- PA-10A Drop-in Mobile DC Power Adapter (w/Trickle Charge)

Desktop Rapid Chargers
- NC-50 Dual Sequential (requires CA-10 Charger Adapter)
- CA-10 Charger Adapter (Includes set of 2)

VOX Headset
- VC-22

Soft Vinyl Cases
- CSC-66 for FBA-14 or FNB-33/38
- CSC-67 for FNB-31

Microphones
- MH-12A2B Speaker/Mic
- MH-19A2B Mini Earpiece Mic
- MH-29A2B Display Speaker/Mic
- MH-32A2B Mini Speaker/Mic
- CT-51 Cloning Cable

PC Software
- ADMS-1 Windows™ Programmable Software

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WORLD OF IDEAS

BY DAVE INGRAM, K4TWJ

A LOOK AT THE WORLD AROUND US

QRP Alive with Thrills and DX!

Flash! Plans are being made for Dave to host a keys refurbishing workshop at the Huntsville (Alabama) Hamfest in mid-August 1995. If you have unusual keys or bugs to clean up, sell, swap, or evaluate for age/value, bring them and join this first-of-a-kind CW adventure!

Do you often get the feeling you are working less than your fair share of DX? Say the rare ones boom in at your QTH and you pump out a healthy signal in return, but those BYs, ZKs, and VUs continue coming back to everyone except you? Well, friends, maybe you are running too much power to stand apart from others in the pileups. Too much power? Why sure. Everyone knows those S9 and stronger signals among the multitudes are just more U.S. stations blindly joining the wolf pack (ere they would not yell "Roger. You are also 59. Please repeat your call letters."). The real secret to working DX like a champ is reducing your output power—right down to the magic 5 watt QRP level. Yes indeed! Then those sharp DX operators will perk up and assume they too have snagged a rare one. Bang—before they realize what happened, you have reached out thousands of miles, written your call in their logs, and simultaneously laughed at the big guns. Alley Oop! Now think a step further: If 5 watts has that much "attention grabbing clout," visualize what you could work with 1 watt or even 500 milliwatts. It boggles the mind! That's life in the QRP lane, and it's a blast! Would Dave lead you astray?

As a living testimonial to the aforementioned thrills and DX, let's open this month's column with a true-to-life example of "less is better." Read on!

Photo 1– If you have ever wondered what a world-record setting QRP station looks like, check out this view of WG5G's station. The main rig is a TS-130V, the QRP version of Kenwood's TS-130S. Dan used it to become QRPer number one on the DXCC Honor Roll.

WG5G—QRPer Supreme

Anyone doubting the incredible capabilities of QRP and the superb DXing abilities of top QRPers need only talk with Dan Walker, WG5G, a Texas resident who recently made the DXCC Honor Roll using QRP exclusively. Yes, you read that right: 317 countries worked and confirmed while running only 5 watts. Further, Dan accomplished this admirable feat during a single sunspot cycle (11 years) and while also holding down a regular job as an electronic technician. Along the way he also made Worked All Zones and Worked All States—via QRP, naturally. Dan now has his sights set on 5 Band DXCC/QRP and 5 Band WAZ/QRP, and I will bet he reaches both goals without even resorting to use of 1 watt or 500 milliwatt power levels. When you're (QRP) hot, you're hot!

Views of Dan's modest setup are shown in photos 1 and 2. Notice he made the big league without spending a fortune on gear. Hmm . . . maybe there is an underlying lesson here. A reasonably priced rig can be left on almost continuously and used like crazy, whereas new multi-kilobuck rigs usually warrant more meticulous care and respect. Dan's setup consists of a Kenwood TS-130V (QRP-only version of the TS-130) with an optional CW filter, external VFO, and a Heath antenna tuner. Aside from earphones and sharp operating techniques, no special frills are used. The present antenna system at WG5G is a four-element quad on

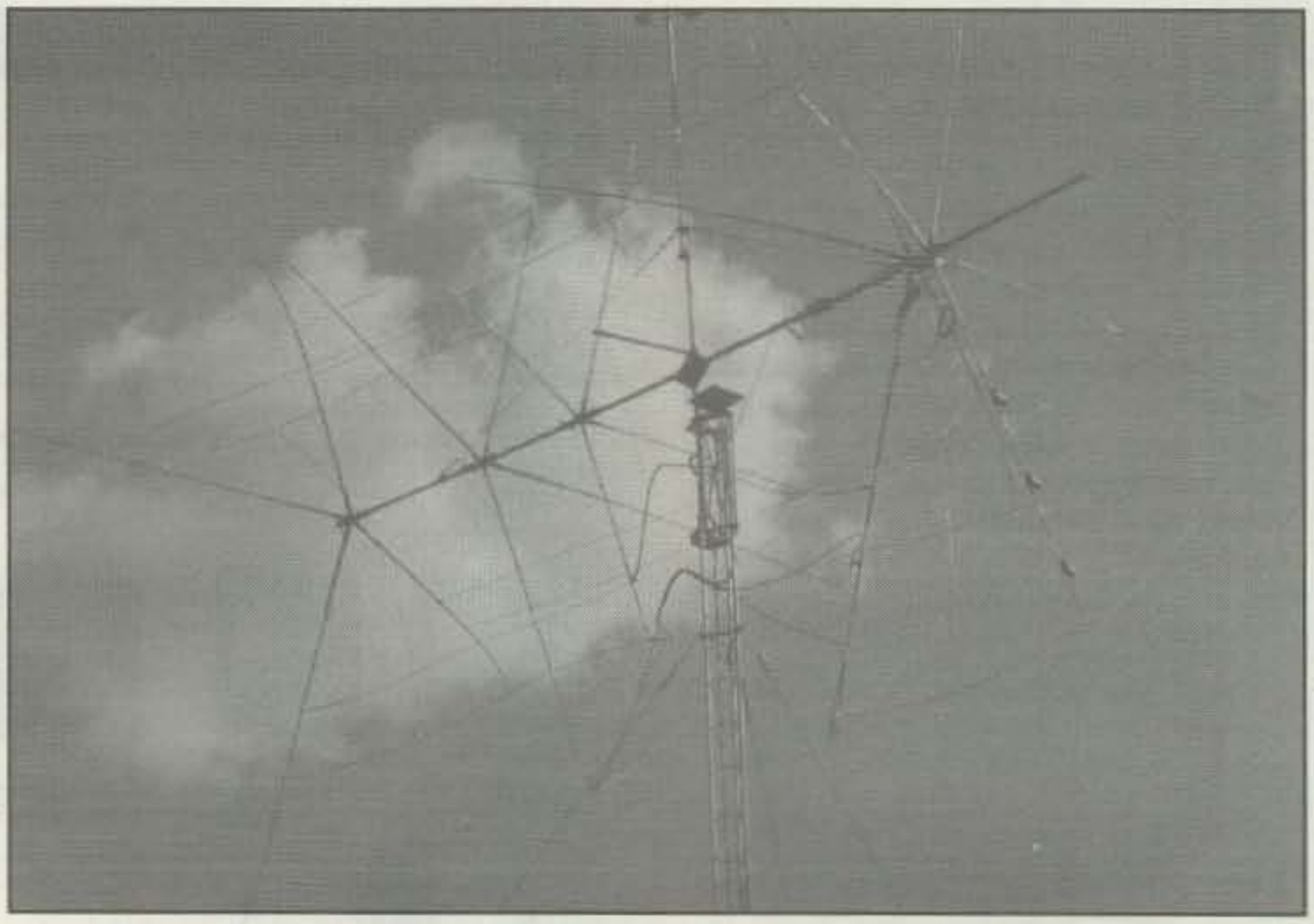

Photo 2– The present antenna in use by WG5G—a four-element quad sitting on a 50 foot tower. The antenna and the operator always make the big difference!

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Say You Saw It In CQ

a 50 foot tower. However, smaller antennas such as a two-element Yagi were used to reach the 100 or 150 country level.

Aside from dedicated use of QRP, what are Dan's secrets of DX success? "Persistence, practice, and a bit of psychology make the big difference," he says. "Never give up chasing needed countries. Learn their operating habits, preferred frequencies, and operating times, and then use that knowledge to spot each DX station in a hopefully predicted manner. Check a band or bands even when they are assumed closed. Listen, listen, listen for DX at every opportunity and at every inconvenient time. Practice cracking pileups over 'easy' DX to sharpen your skills. Use your rig's dual VFOs for working DX on split frequencies, and use an omnidirectional (vertical) receiving antenna to spot the best frequency for calling DX in split-frequency pileups. Use your rig's attenuator and an optional 500 Hz CW filter to give yourself a mental advantage among the multitude (it is less intimidating when you and the DX station seem the only ones on frequency)." Finally, as Dan and I agree, never scrimp on your antenna system. You are on the right track when you can walk outside, look up, and say, "What a big antenna for such a little rig." Our hearty congratulations to WG5G on his QRP DXing success. It is highly commendable from any viewpoint and obviously qualifies him for the QRP Hall of Fame.

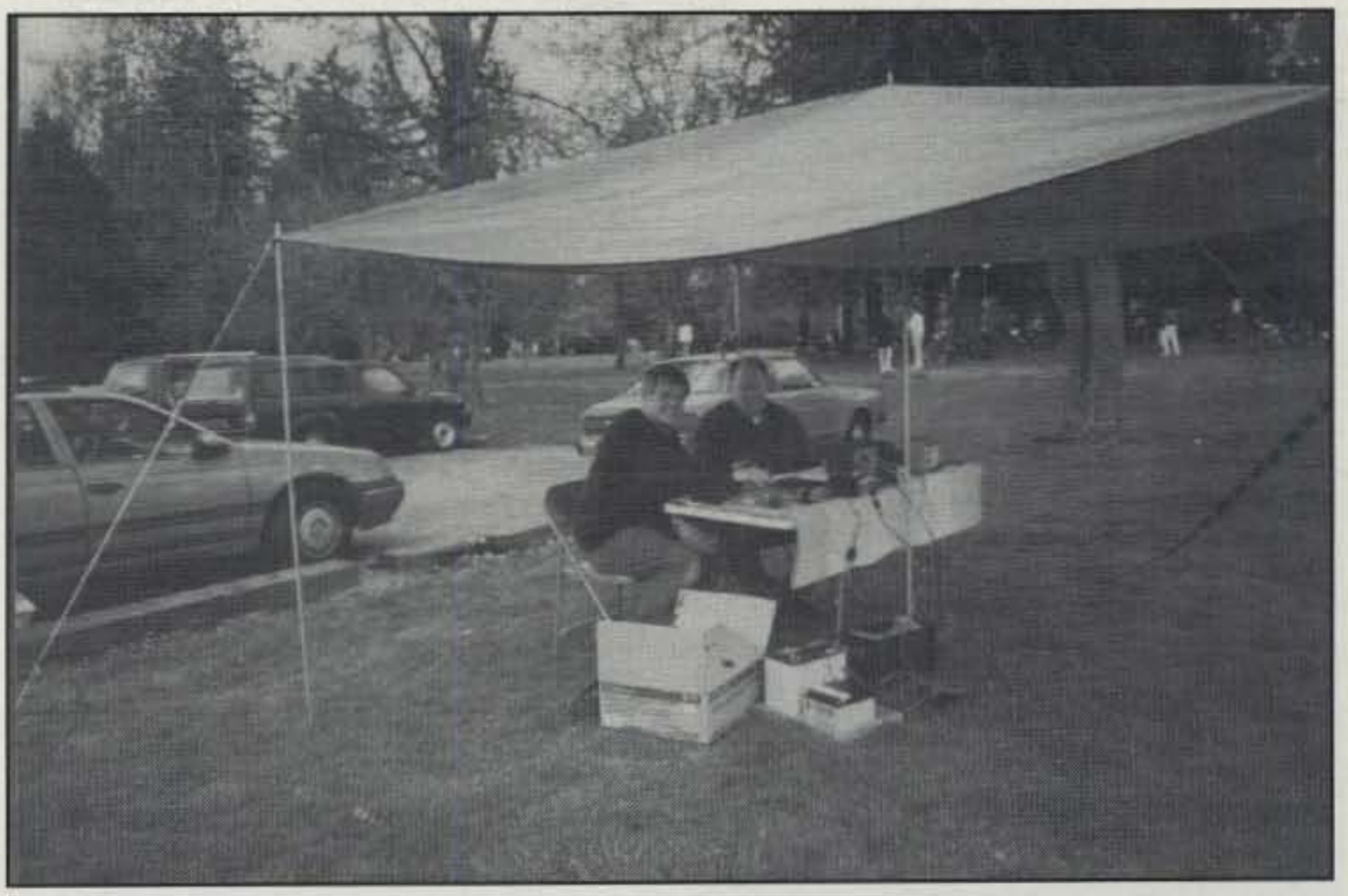

Photo 3– Bob, WU7F (left), and Roy, W6EMT (right), operating "tent style" from Washington during the first "QRP To The Field" exercise held during early April.

QRP To The Field!

Working exotic DX and shooting big guns out of the saddle are only two of QRP's many attractions. Two more always-popular areas of interest include operating portable and contesting. Combine that pair, and you definitely have the prime ingredients for outdoor hamming fun!

More exciting QRP contests are being initiated every year. A few months ago, for example, the Northern California QRP Club sponsored a new "QRP to the Field" event, and it went over great for its limited prepublicity. The contest *per se* was planned as a QRP prelude to Field Day. However, it now looks as if it will be an annual rally that may even be encored with a "QRP Afield" in the fall. Terrific! So who do you contact regarding future "QRP-Field"

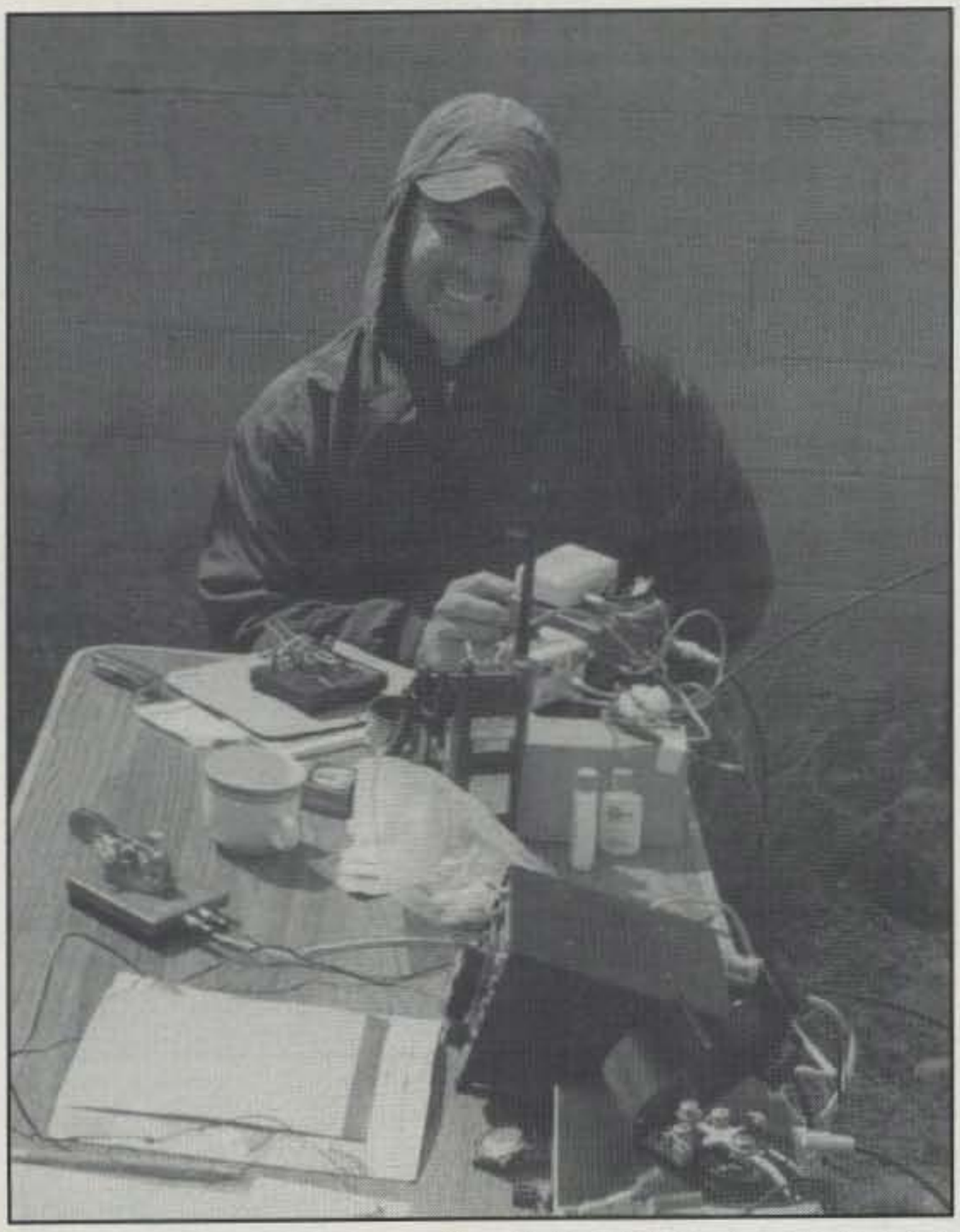

Photo 4– Doug, AB4WT, posed in official "QRP To The Field" clothing while Dave, N1IRZ, stepped back from their shared desk (atop Baldy Mountain, New Mexico) to shoot this photo. Note nice, new Index Labs' "QRP Plus" rig in front of picture.

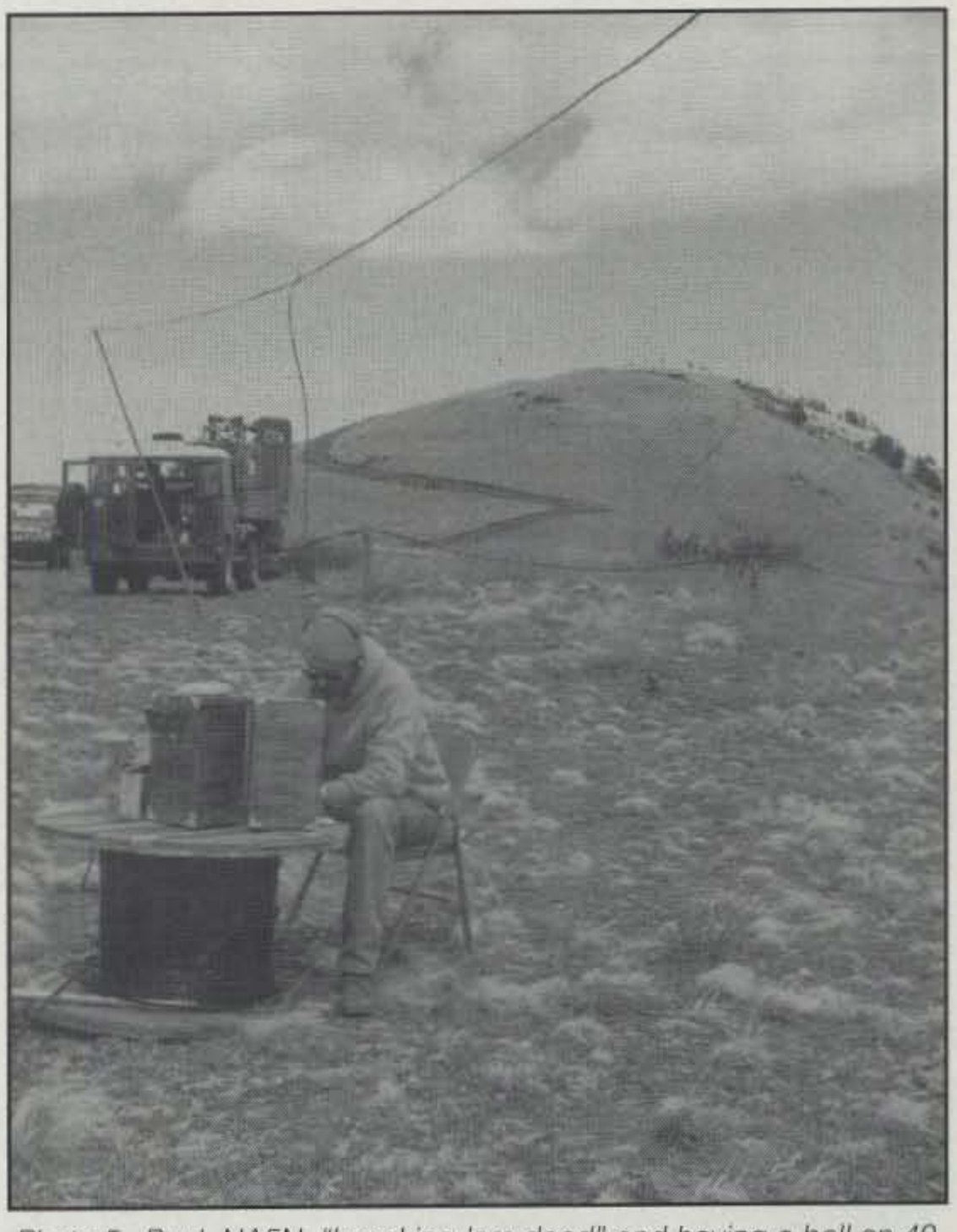

Photo 5– Paul, NA5N, "knocking 'em dead" and having a ball on 40 meters. Complete station is enclosed in a custom-made wood case. That's Baldy's peak at 10,700 feet above sea level behind him.

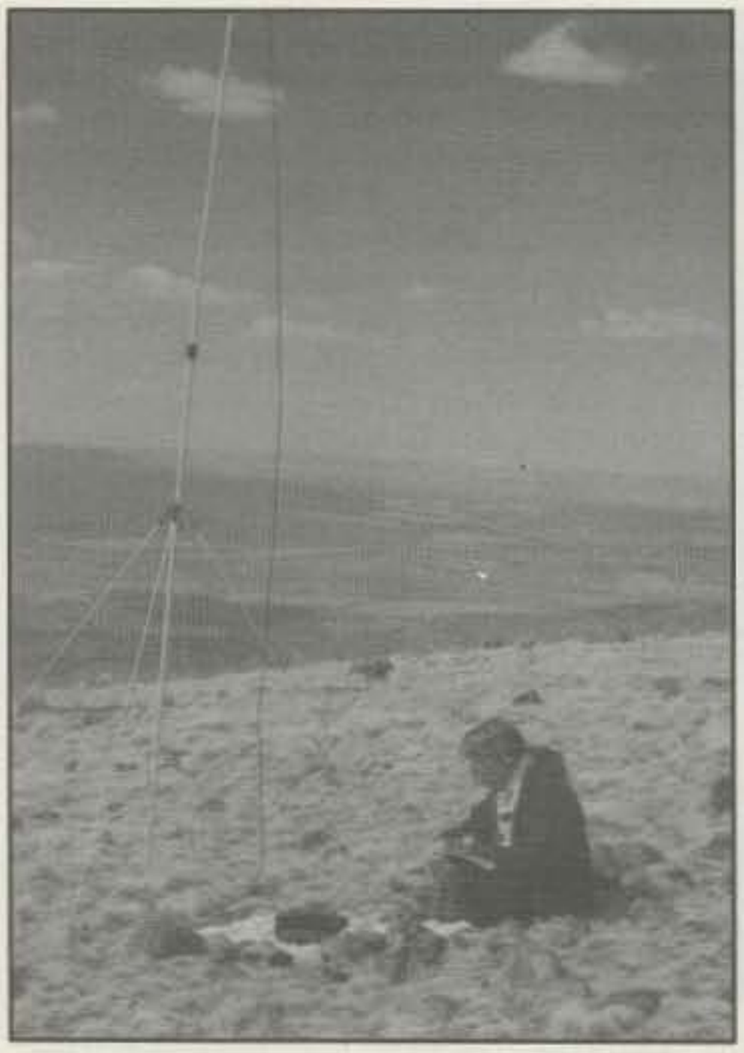

Photo 6– Chuck, W5UXH, did not say much about his "QRP To The Field" score, but he definitely had the ideal location. Check out that view! Wow! Thanks to Dave, N1IRZ, for serving as the official "Baldy photographer."

contests? Drop an SASE to Bob Farnworth, WU7F, 6822-131 Avenue SE, Bellevue, WA 98006-4038 for details. Meanwhile, let's peek at a few firsts in photos of this hearty venture held between 1600 and 2400 GMT on April 1, 1995.

Photo 7– Front view of 624 Kit's new "Deluxe 5 watt transceiver." The unit is available for any band between 80 and 15 meters, and the 30 meter version I checked out worked exceptionally well.

Contest promoters Roy, W6EMT, and Bob, WU7F, set up operation in a nice, quiet park near Redmond, Washington (photo 3). Fortunately, area rains tapered off during their outing. Unfortunately, however, a surprise soccer team recruiting party sprang up almost beside them. The duo did well, however—35 QSOs on 17, 20, and 40 meters in roughly 6 hours of continuously interrupted operation. Their main rig was a new NorCal QRP transceiver designed by W6EMT, a vertical, and a 20 meter beam on a short mast. The NorCal transceiver is a "new kid on the block" and details are sketchy at this time, but I understand it is a super rig. Possibly we will mini-review it in a future column. Stay tuned.

QRP enthusiasts in the Socorro (New Mexico) Amateur Radio Association really jumped into the field event by going on an expedition to the top of South Baldy mountain and operating 10,000 feet above sea level (photos 4, 5, and 6). The boys set up stations around an old comet observatory building, strung dipoles, half froze, and had a ball. Dave, N1IRZ, wrangled 14 QSOs on 20 meters using his new Index Labs "QRP Plus" transceiver. Doug, AB5WT, made about a dozen QSOs on 40 meters with a NorCal rig, and Paul, NA5N, worked 17 stations with an MFJ-9040 rig. When asked if they would do it again, all said "you bet." Obviously, another big-time QRP contest is off to a rollicking good start. Watch it grow during coming seasons!

New 624 Rig Looking Good

Another appealing aspect of QRP is its high enjoyment-to-dollar ratio (better known as a lot of ham for a little bread!). Plus, in many cases you gain the pride of building your own rig. Case in point: 624 Kit's new "Deluxe 5 watt transceiver" shown in photo 7. You can get this little gem with all the trimmings for only 150 smackers, assemble it for any band between 80 and 15 meters, and span the globe with a big 5 watt signal. Now that's living! I recently fired up a new 624 "Deluxe" on 30 meters, and I've been having a ball with it (that is, until 8 PM, when the band goes flat and EWBN's international broadcasts blanket half of the shortwave spectrum). I even forget the "Deluxe" is running QRP, jump into DX pileups, and by jove, usually wrangle a contact within two or three calls. What's my secret to success? First, high-power signals are forbidden on 30 meters (giving QRP a good edge), and second, I send fast, so the DX can reply to me while others continue calling. I often wonder if my (surely weak) dots are long enough to be heard, but who can argue with success, and especially such low-cost success?

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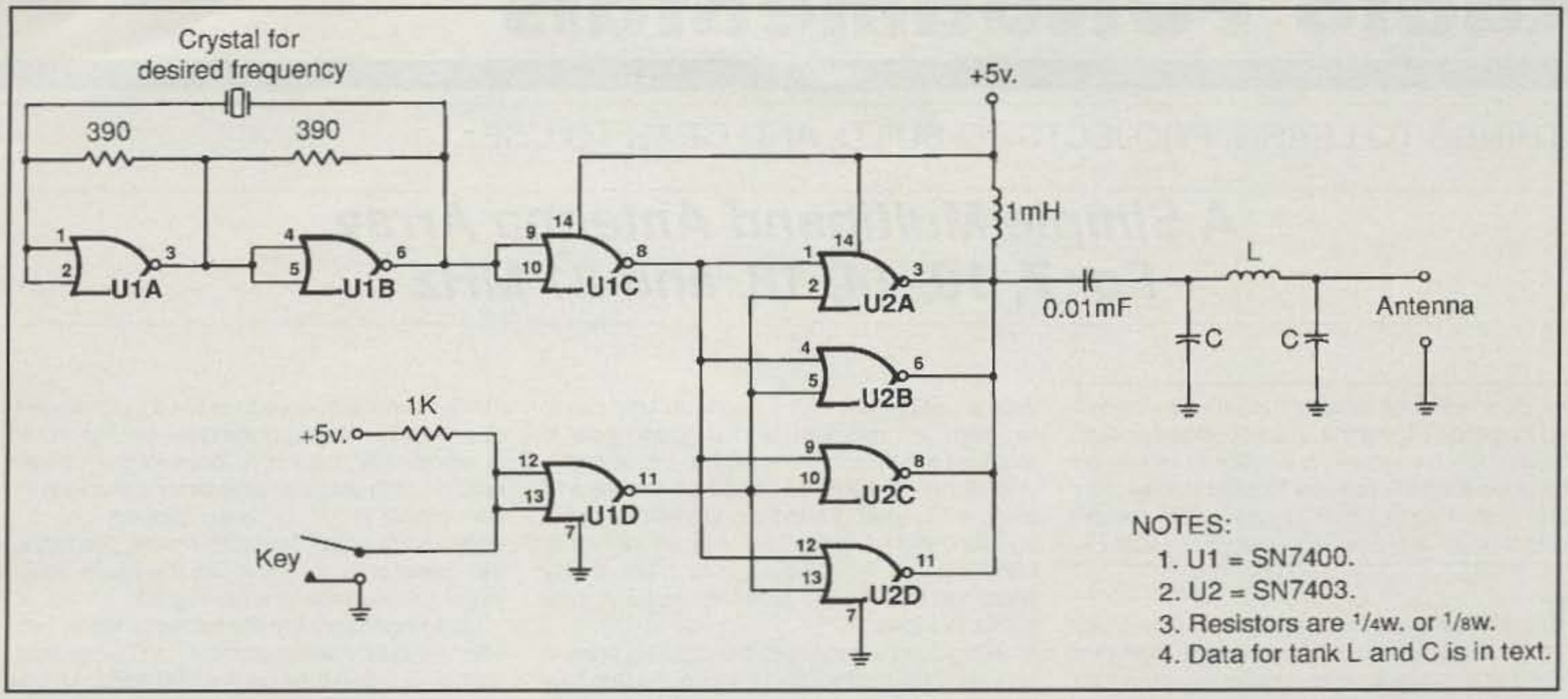


Fig. 1– The internationally famous two-chip 250 milliwatt transmitter. Glue an "L"-shaped piece of metal to the top of U2 for a heat sink. Use four 1.25 volt rechargeable mini cells for power. Thanks to OK QRP Klub for the diagram (additional info in text).

The new "Deluxe" is an upgraded version of the popular ARRL "Gary Breed Transceiver" originally described in 1990 *QST*. It sports a stable VFO, superhet receiver with double balanced mixer, AGC, four-crystal IF filter, and a smooth-handling transmitter that runs quite cool at 5 watts output. It also has semi break-in with adjustable delay, an illuminated S meter, and plenty of volume to drive its internal speaker. If the transceiver was much more elaborate, it would fall outside the general "easy to build" category. Our congratulations to 624 Kit's leader, Pat Bunn, on "rounding out" his line of QRP goodies with a winner. Want to know more about the "Deluxe" or other 624 kits? Drop an SASE in the mail to 624 Kits at 171 Springlake Dr., Spartanburg, SC 29302.

The Milliwatt Scene

As most dedicated QRPers are aware, there is a fascinating second layer of low-power fun and enjoyment starting at around the 1 watt range and extending right down to the microwatt level. In fact, some of you probably have grinned about (unknowingly) beating out these milliwatters in the pileups, and not even realized such a feat was little more significant than outrunning a go-cart with a Ferarri. Ah, but milliwatters get the last laugh when they patiently endure and emerge with a QSO using a rig that costs only a few bucks to build and fits in the palm of your hand. Now that's awesome!

Several amateurs have asked me about the milliwatt bug, and I can only say it is a quite elusive little critter. It frequents small parts bins of electronic parts stores and hamfest fleamarkets, and often sneaks into our shacks through the pages of monthly amateur radio magazines (sic!). Only last week, for example, one jumped right off the page of an OK QRP Klub newsletter (sent compliments of Peter, OK1CZ, the club chairman, an outstanding QRPer, and a fellow key collector) onto my arm. One of several featured circuits was the internationally popular two-chip 250 milliwatt transmitter shown in fig. 1. Now who could resist building this gem as a keyfob using miniature parts and flexible PC board material!

As you can see in fig. 1, the heart of this little pup is a group of NAND gates: two being used as an oscillator, one as a buffer, one as a keyer, and some higher power NANDS as RF amplifiers. The OK version used two (half an SN7403); other versions I've seen use four wired in parallel (as long as they are in the chip, why not use them, right?). The crystal is a small HC "garden variety" fundamental type, and the tank circuit is similar to those used with regular transistor QRP transmitters. Naturally, the crystal and tank circuit should be resonant on the same band/frequency. My homebrewed version uses a T-50-2 core with 12 turns for 30 meters (and 390 pFd capacitors). Shifting to 470 pFd and 14 turns should be fine for 40 meters, or 820 pFd and 30 turns could be used for 80 meters. Notice the oscillator runs continuously, so it could provide an injection signal for a mating DC receiver. I will leave "designing details" of that idea to your ingenuity.

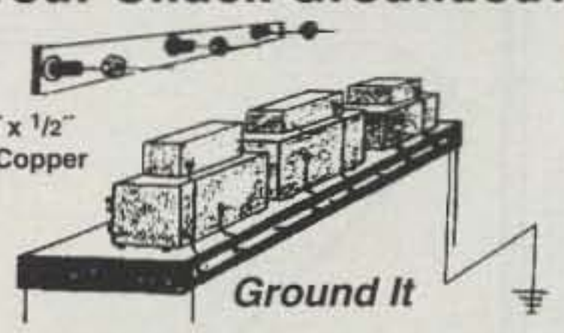
So, dear friends, doth ye feel the bug-a-biting? Go for it, and we be listening for you on 30 meters. Build one in a unique enclosure (maybe a hollowed-out Mickey Mouse or Dino figurine), shoot a good picture of it, and we will include it in a future QRP column. Fair enough?

Conclusion

That wraps up another QRP special, and it also sets the stage for a super QRP sequel. Yes, and with your input or a copy of your QRP club's newsletter, that future column can really be terrific. A while back the Michigan QRP Club had a "Mity Mite" transmitter circuit worthy of re-recognition, and the NW QRP Club offered "30-30" Kits. The QRP ARCI and G-QRP groups always have some favorite rigs/circuits that need more recognition. Then, too, there are on-the-air meets and mini-contests everyone could learn about through *CQ*'s worldwide circulation. Let's include views from all corners of the globe, too: VK (has anyone heard from the "Lo Key" Club lately?), ZL, JA, and more! If you wish a reply to your letter or photos, include an SASE. Otherwise, watch for the next "who's doing what" QRP column. One final note: A blowout mix of QRP and classic 1950s gear that is incredibly easy to homebrew is slated for next month's column (assuming all goes smoothly during the coming weeks!). Watch for that super special! Until we meet on 30 or 20 meters . . .

73, Dave, K4TWJ

Is Your Shack Grounded?



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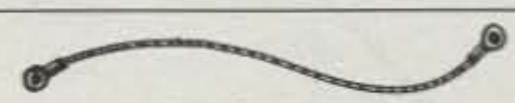

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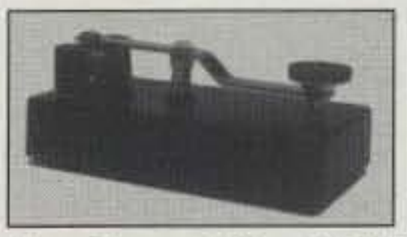

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Radio FUNdamentals

BY BILL ORR, W6SAI

THINGS TO LEARN, PROJECTS TO BUILD, AND GEAR TO USE

A Simple Multiband Antenna Array For 7, 10, 14, 18, and 21 MHz

As Bill mentioned several months ago, he will no longer be writing the "Radio Fundamentals" column for us each and every month. However, he does plan to continue to enlighten us now and then. This month Bill picks up his column with a novel antenna—the Lazy-V. —K2EEK

It's difficult to put out a loud signal from a city lot. It's equally difficult to work more than one band from a city lot. Yes, I know all about trap dipole antennas, G5RV antennas, and off-center-fed antennas. In fact, some of my past columns covered these antennas in detail. They all have their problems. The G5RV and OCF are long wires and require plenty of space. The trap dipole may prove to be fragile, and it is difficult to make waterproof traps. However, there's another approach to the problem: the Lazy-V antenna.

The Lazy-V is a novel antenna that may fit your situation to a "T." It takes up little room. No traps are required, and only one pole is required to support the antenna. Interested?

Well, the antenna is based on the idea of using a 40 meter ground-plane vertical (about 33 feet 6 inches high) as a support for higher band dipoles. The dipoles, in fact, act as guy wires for the vertical antenna. Nothing new about this idea.

In diddling around with the dipoles, however, various experimenters have found that they seem to perform much better if they are folded back into a "V," with the ends adjacent to the vertical support, and the far ends held away from the tower with a rope (fig. 1). By "much better," some operators say that the dipoles seem to radiate more low-angle DX energy when folded back upon themselves than when they form an in-line configuration—or so the conventional wisdom goes.

There's a lot of literature about using the Lazy-V dipole idea in directive arrays for 160, 80, and 40 meters (see the listing of further reading at the end of this article). In general, the scheme is to use four (or more) dipoles spaced around a supporting tower. One dipole is electrically loaded to present the proper reactance to act as a reflector for a second driven dipole. Four of these dipoles can be switched remotely from the shack, permitting the operator to quickly rotate the beam heading of this interesting array (fig. 2).

Judging from what the users of these two-element beam arrays achieve in DX contests, it's obvious that they pack a real wallop! If you are interested in such a one-band beam, search out the articles at the end of the article.

This is a one-band approach. However, how about using individual Lazy-V dipoles for different bands, supported from a 40 meter ground-plane antenna? That would provide multiband capability from a single supporting structure.

The Single Lazy-V Dipole Approach

Recently some operators have had luck with

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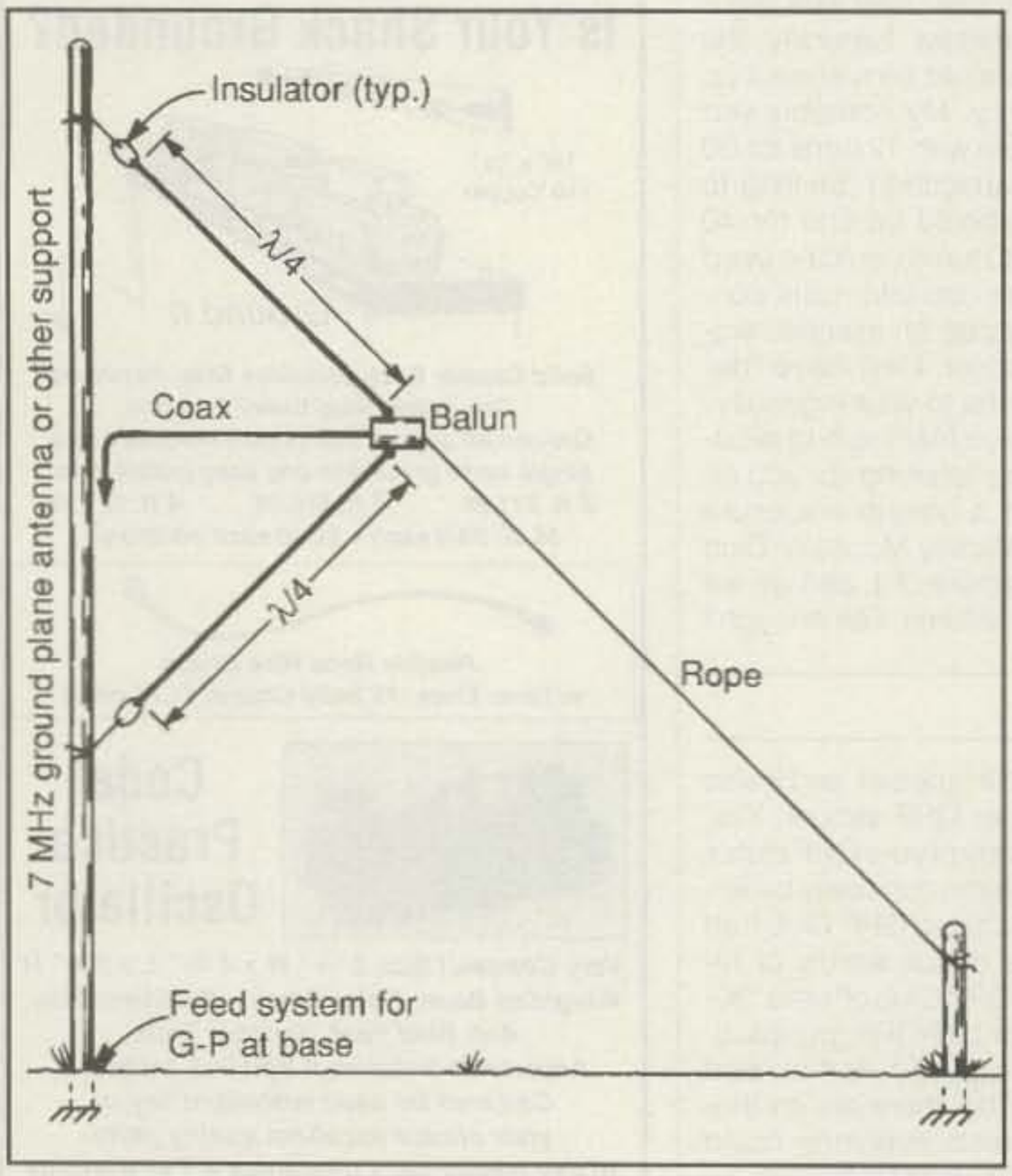

Fig. 1– Typical Lazy-V antenna can be supported by 7 MHz ground plane. Keep coax several inches clear of ground-plane antenna.

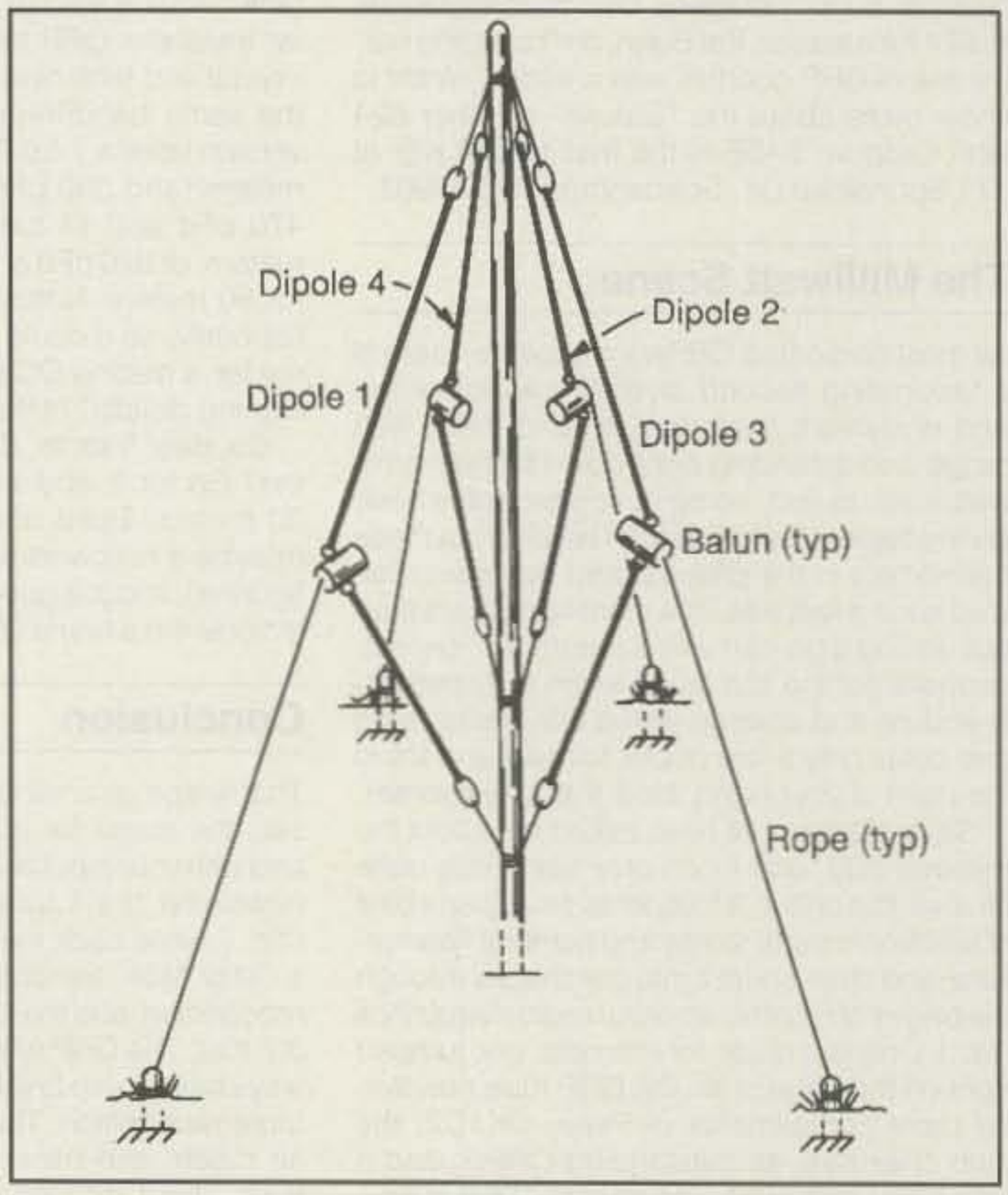

Fig. 2– Four dipoles 90 degrees apart mounted on mast form four-band switchable antenna system.

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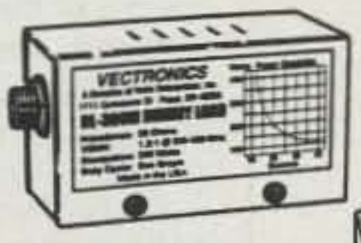

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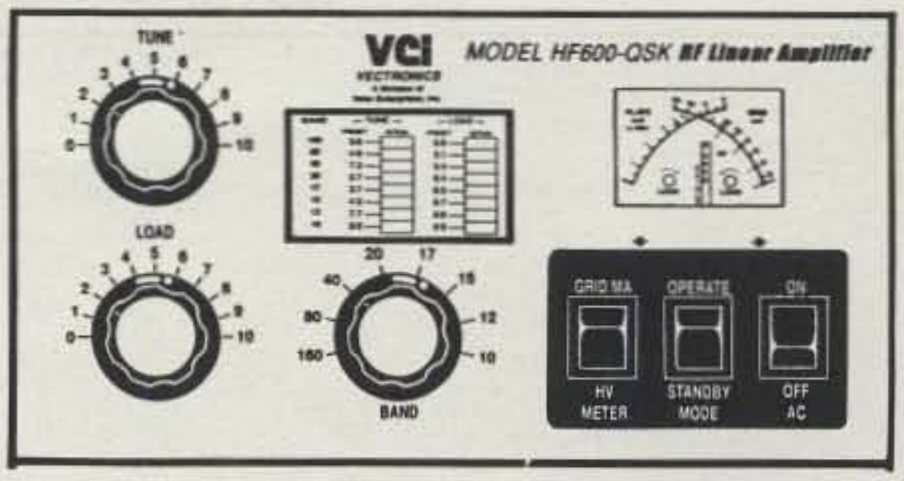

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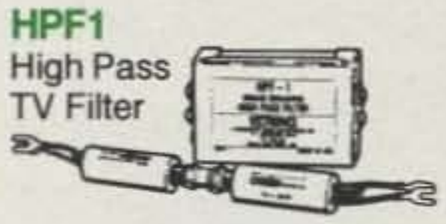

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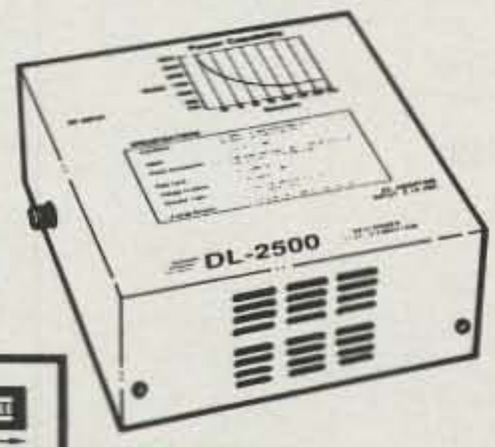

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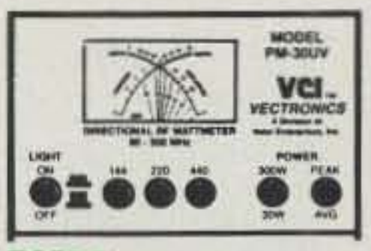

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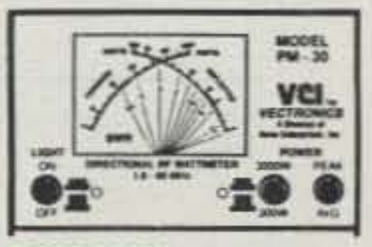

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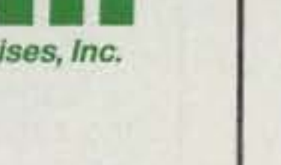

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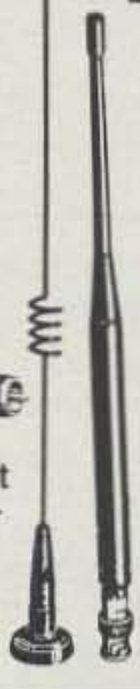

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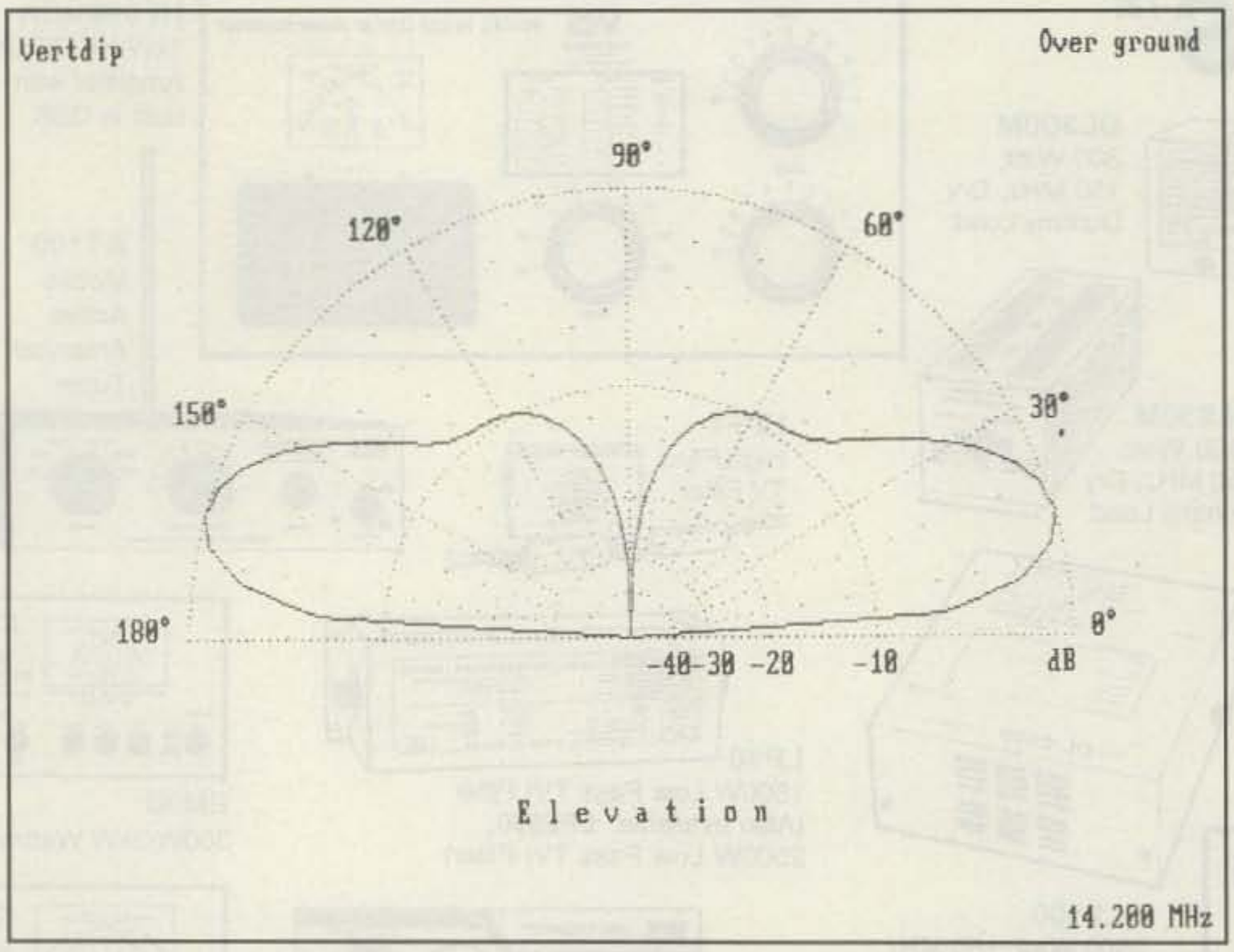

Fig. 3– Pattern of vertical dipole with base 7 feet above ground. Maximum takeoff angle is about 17 degrees.

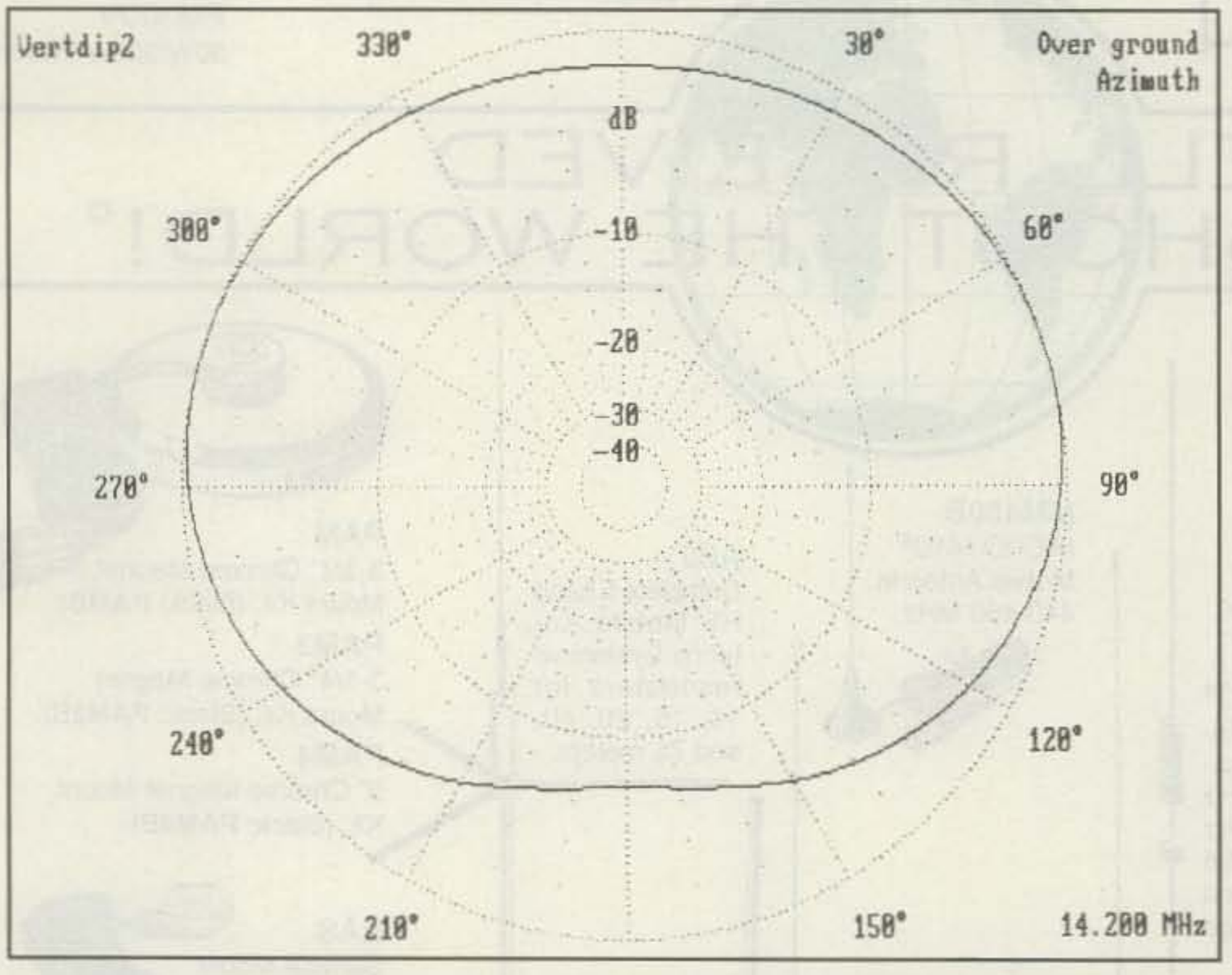

Fig. 4– Dipole tilted at 45 degrees exhibits slight front-to-back ratio. Pattern is "away" from support located at 180 degrees.

just a single "Lazy-V" dipole, extolling its low-angle gain and seeming DX improvement over a vertical or sloper antenna. If true, this would make this simple antenna a real winner.

It is instructive to look at a single dipole and see how it plays. A general determination of performance can be made with an antenna analysis program. I chose to do this task with the MN 4.5 program of K6STI. There are other programs that will do the job equally as well.

If the antenna does what some enthusiasts believe it does, the next step would be to try multiple dipoles, one each for a single band, and see how this layout functions as a multi-band antenna. This article describes just such a combination of antennas, suitable for 7, 10, 14, 18, and 21 MHz operation.

Eighty meter operation was not considered, as the resulting antenna would be too large, and 24 and 28 MHz were dropped because these bands are not worth very much at the bottom of the sunspot cycle. The five bands selected, however, are very much alive with plenty of DX, and this simple antenna may help you snag some of it!

Another investigation would be to analyze two dipoles in a beam configuration. This has been done by others (see further reading), and for me to do it again would be reinventing the wheel. Therefore, I dropped this idea.

A Vertical Test Dipole

What I want to know is the field pattern of the Lazy-V dipole and how it compares with a vertical dipole and a dipole inclined at a 45 degree angle. These three configurations can be compared quickly on the computer.

The first experiment was to evaluate the vertical dipole. My model was cut to a length of 33 feet 6 inches. I chose an element made of #18 wire, as I had plenty of that if I decided to build the antenna. The test frequency was 14.2 MHz and the base of the antenna was placed 7 feet above ground, making the top of the antenna/mast reach the 40 foot level. These figures were inputted to the computer program, and the analysis showed that the feedpoint impedance at the center of the dipole was about 72 ohms and the main lobe of the antenna fell at an elevation angle of about 16 degrees (fig. 3). High-angle radiation is nicely suppressed, being reduced by 10 dB or more at angles above 60 degrees. In comparison, a quarter-wave ground plane has a takeoff angle of about 25 degrees.

The Tilted Dipole at 14 MHz

The next step was to tilt the dipole at an angle of 45 degrees. Feedpoint resistance increased to about 78 ohms, and a slight front-to-back ratio of about 5 dB was apparent (fig. 4).

The elevation pattern, alas, exhibited a lot of high-angle radiation (fig. 5). At 15 degrees the pattern was down 3 dB when compared with the vertical. Maximum radiation appeared at about 58 degrees. Great stuff if you want to talk to an amateur a few hundred miles away. Not so good for 20 meter DX! As far as I was concerned, this eliminated the tilted dipole as an effective 20 meter antenna.

The Lazy-V Dipole at 14 MHz

The next step was to configure the dipole in the Lazy-V design (fig. 1). A computer run showed that the azimuth pattern was practicaly omnidirectional; the null of the tilted dipole pattern had disappeared. The elevation plot looked something like that of the vertical dipole (fig. 6). Low-angle radiation peaked at about 16 degrees, but a high-angle lobe, absent in the vertical configuration, was apparent. By comparing the plots of the two antennas (figs. 3 and 6) it could be seen that the Lazy-V afforded no signal gain over the vertical, but instead produced some high-angle radiation that is relatively useless.

The next question to be considered is as follows: What is the effect on the Lazy-V antenna of the supporting mast? It was easy to eliminate or replace the vertical/mast support on

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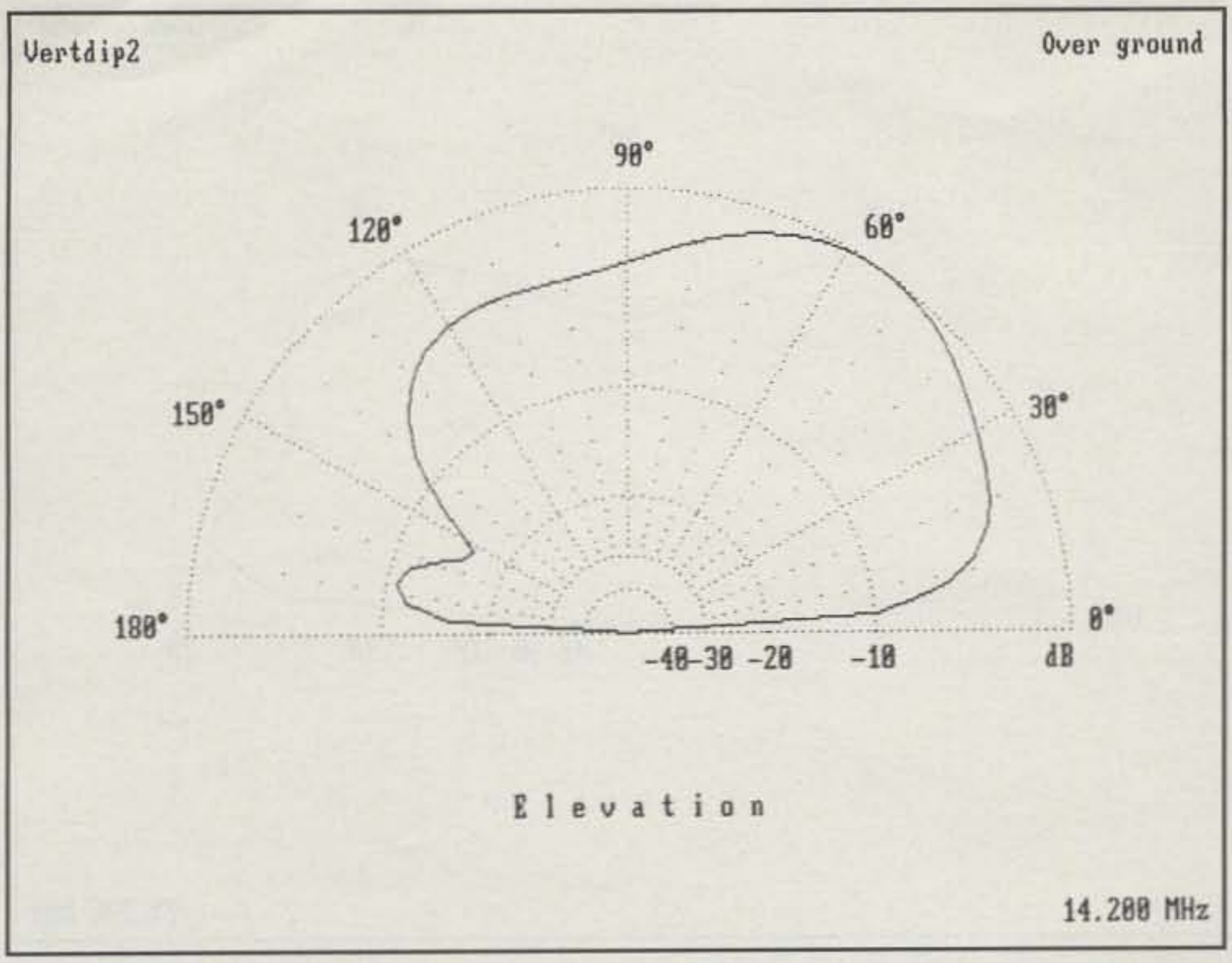

Fig. 5– Pattern of dipole tilted at 45 degrees exhibits unwanted high-angle lobe. Directivity is "away" from supporting tower.

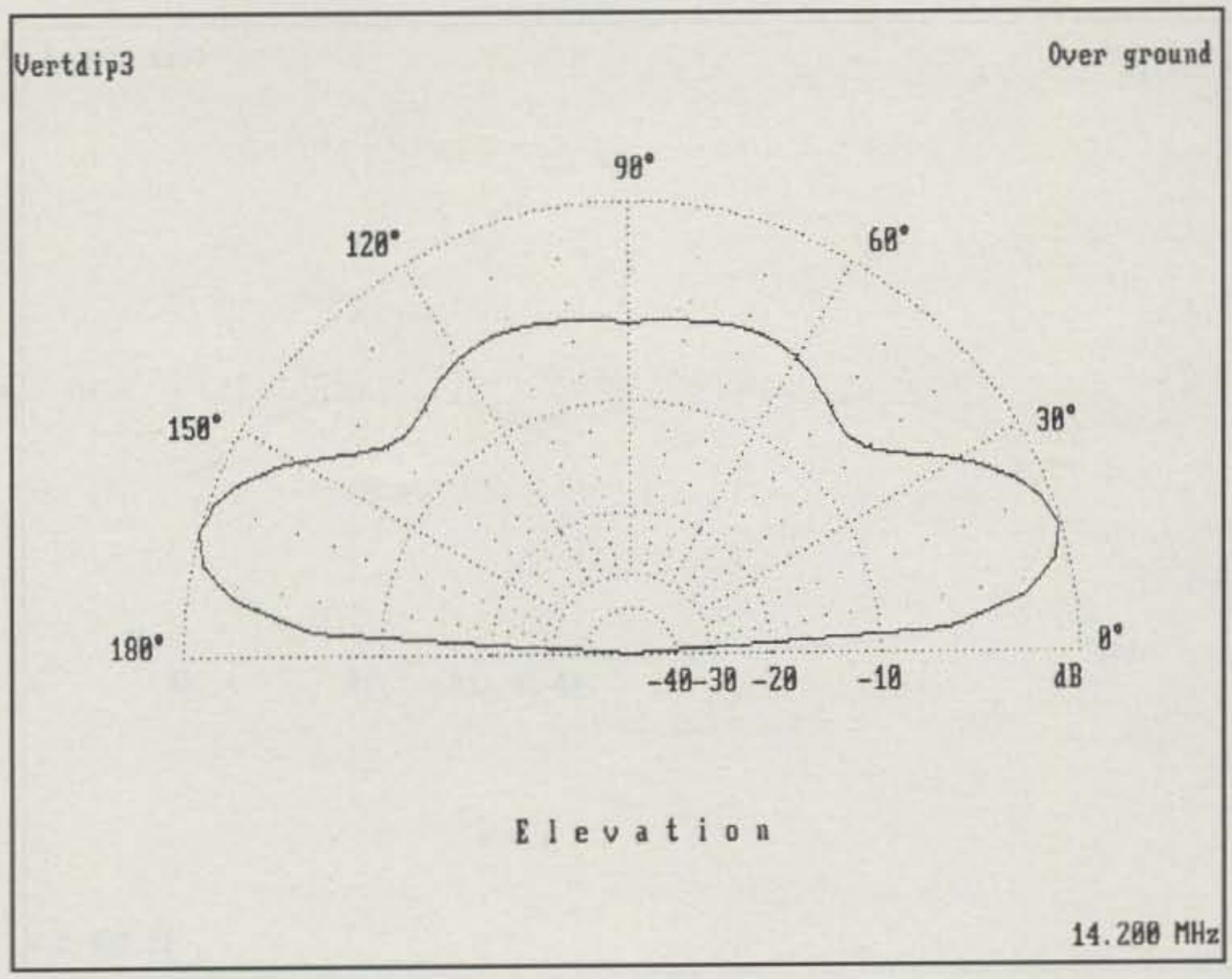

Fig. 6– Pattern of 20 meter Lazy-V dipole with top at 40 foot height. Maximum radiation lobe is about 15 degrees.

the computer program. A 3 inch diameter mast placed 2 feet away from the Lazy-V antenna had only a minor effect, with slight variations in the pattern, depending upon the distance of the mast from the Lazy-V antenna tips.

That's the summation of the 14 MHz runs. While the Lazy-V does show high-angle radiation, it still produces a low-angle lobe equivalent to that of the half-wave vertical antenna. Placing several Lazy-Vs around a ground-plane vertical provides a multiband antenna that doesn't take up much space.

The 21 MHz Lazy-V

The next step was to reconfigure the computer program for a 21 MHz Lazy-V, with the top

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wire tied off at the same level as that of the 14 MHz design.

Analysis showed the feedpoint impedance of the Lazy-V to be about 45 ohms. The elevation pattern had a split lobe, with maximum radiation at 13 and 47 degrees (fig. 7). The low-angle radiation is excellent, but the high-angle radiation merely warms the ionosphere.

Radiation Patterns At 10 and 18 MHz

So far, so good. The Lazy-V looked promising enough to check it out on the two remaining bands: 10 and 18 MHz.

At 10.1 MHz the feedpoint impedance of the Lazy-V is about 51 ohms. Good match! The azimuth pattern is omnidirectional, and the elevation pattern shows the main radiation lobe at an angle of about 26 degrees (fig 8). Very good!

The bottom insulator of the antenna is only about 4.5 feet clear of the ground in this particular setup. Care should be taken to isolate this point from inquisitive fingers, as it is "hot" when you are transmitting!

The last step was to try a computer run at 18 MHz. Feedpoint impedance runs about 38 ohms, and the radiation pattern is shown in fig. 9. The lowest lobe falls at 13 degrees elevation, and there is considerable radiation at higher angles, peaking at about 58 degrees. This is a usable pattern, in spite of the amount of high-angle radiation.

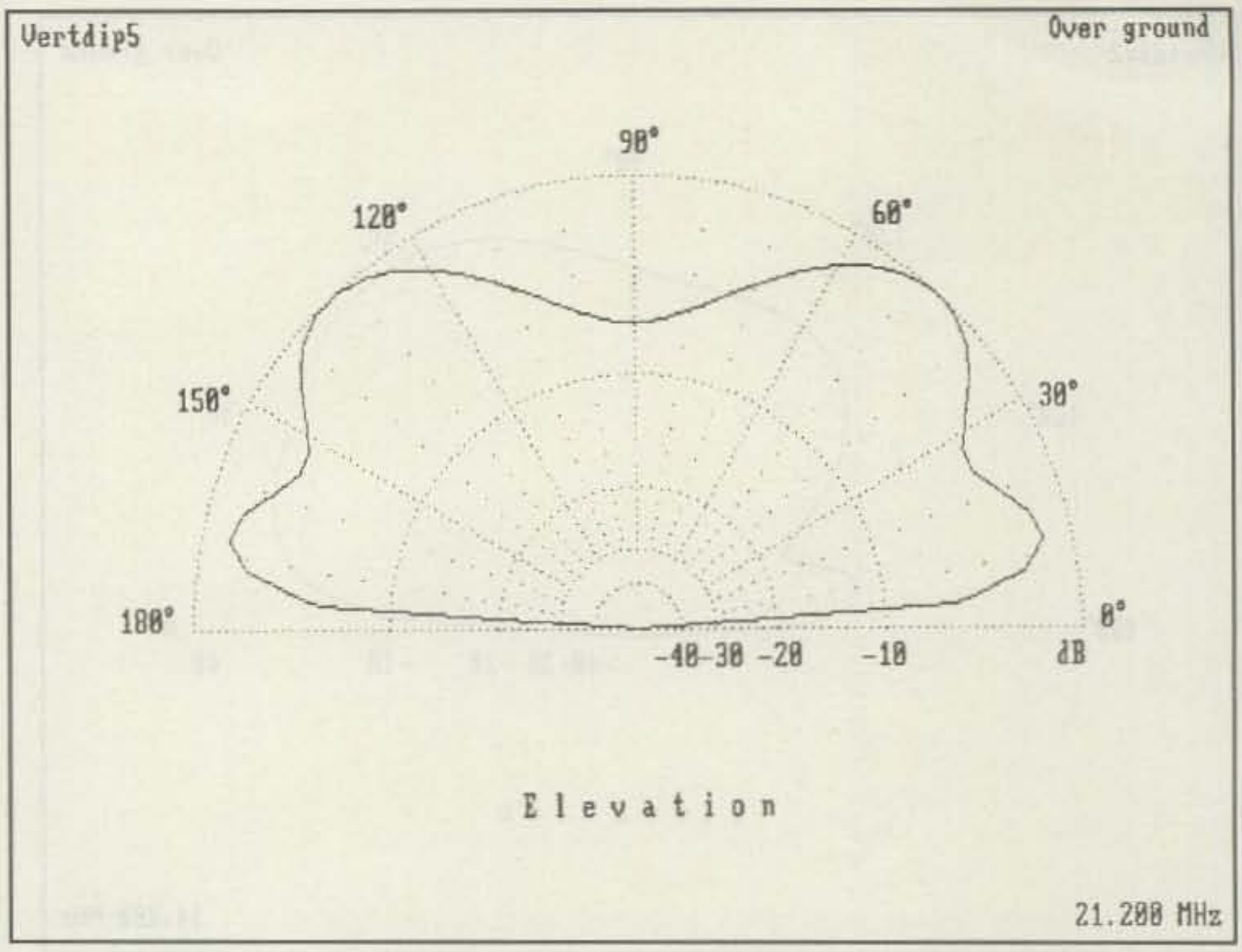

Fig. 7– Vertical plot of 21 MHz Lazy-V with top at about 40 feet. Lowest lobe is approximately 12 degrees.

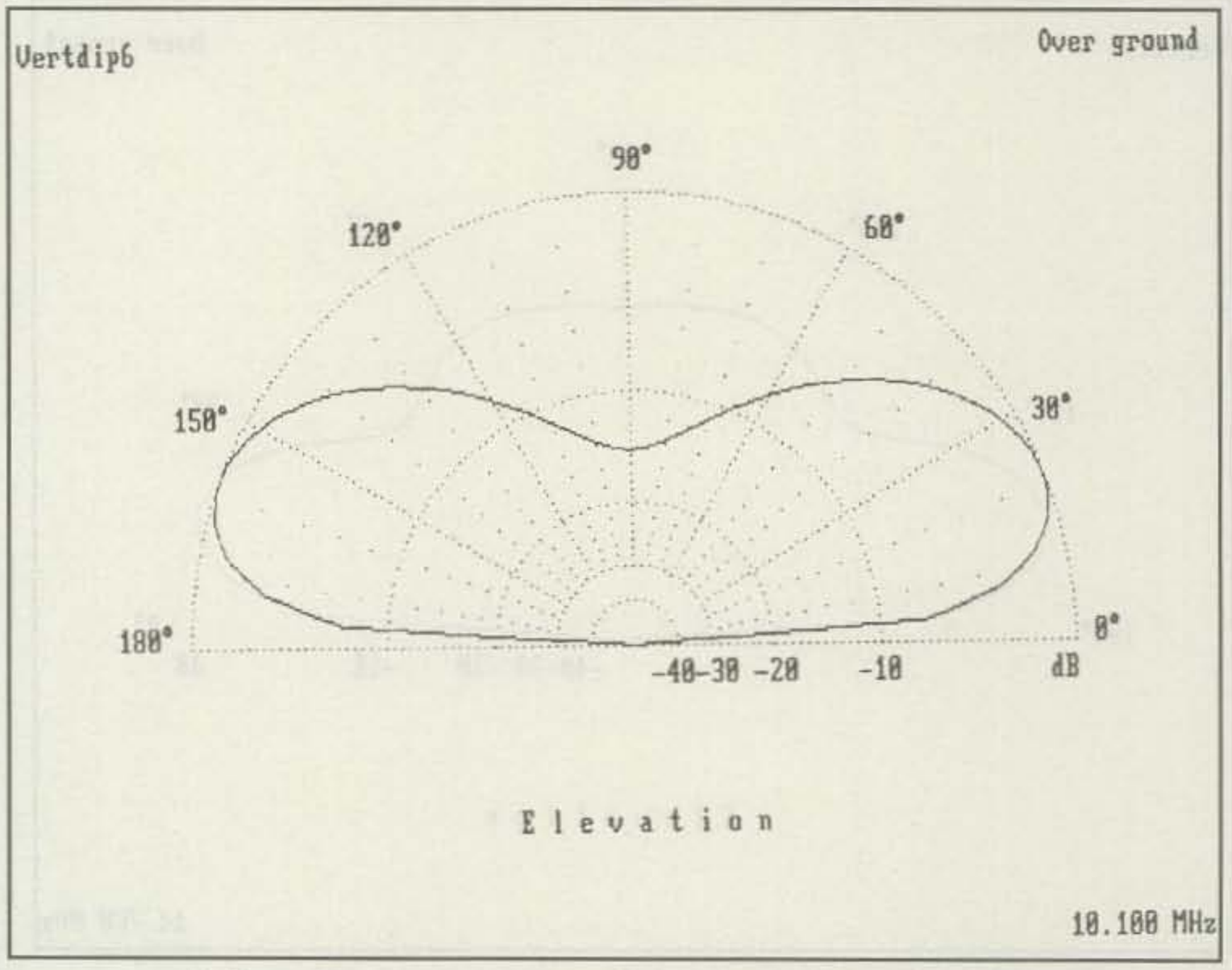

Fig. 8– The Lazy-V pattern at 10.1 MHz. Lobe is at 23 degrees.

Try The Lazy-V Yourself!

If you want to try the Lazy-V yourself, the shack is a good place to start. And, I must admit the idea of placing four or more Lazy-V dipoles around a single mast is indeed tempting. Someday I must try this scheme in the backyard, but I don't expect some of the amazing results some of the backers of this antenna seem to be getting.

Building A Lazy-V Dipole Assembly

Here's the way I would go about building a multiband Lazy-V antenna system. For simplicity I would limit the design to five bands, covered by the vertical antenna/support, plus four Lazy-Vs which make up the guy wires. The basic vertical antenna is made up of three sections of 10 foot TV mast (Radio Shack 18-843) plus one 5 foot section (trimmed to length). A guy-ring and collar (15-835) are used as tie points at the top of the dipoles.

The vertical mast/antenna can be fed directly at the base, or the base can be grounded and the antenna shunt-fed with a gamma match. Five or six radials, about 20 to 30 feet long, are laid out across the grass of the yard. You can bend the radials to fit them within your property limitations.

The first step is to experiment with a single Lazy-V dipole. The apex of the dipole is pulled away from the tower by a rope and tied off at a convenient point. The bottom end of the dipole is led back and tied to the tower about 15 feet above ground. The aim is to make the included angle of the dipole at the apex about 90 degrees. A current balun is used at the feedpoint, and the coax line is brought back to the mast and runs down the side. I would keep the coax clear of the mast, as it might affect 7 MHz operation if it were taped to the mast. Just a suggestion.

At band center (14.2 MHz) the SWR on a 50 ohm line (RG-8X) should run about 1.8. Varying the distance of the dipole ends from the supporting vertical can change this figure for better or worse. As always, the dipole can be trimmed to place the point of lowest SWR at your favorite spot in the band.

Adding Extra Dipoles For Other Bands

Once you have gotten the "feel" of the 7/14 MHz combo, you are ready to add additional

Lazy-V dipoles to your antenna farm. Add them one at a time, and review the SWR on the other antennas after a new dipole is added. SInce each dipole is tuned to a different band, there should be little, if any, reaction between them. If, however, you notice a change in SWR when a dipole is added, it is possible to vary this figure by trimming the coax line of one of the antennas. They are closely coupled together, and an unused dipole, plus its coax line, may inadvertently detune or otherwise upset another dipole. It's not likely, but it could happen.

With the vertical, plus four Lazy-V dipoles, you can cover five bands. You'll need a multiposition coax switch at your operating position, plus an ATU unit. If your transceiver has a built-in ATU, that solves this little problem.

Contrary to some beliefs, this antenna system has unity gain, and like any vertical antenna it is sensitive to ground conductivity. Many handbooks have a table of ground conductivity in the United States. If you live in an area of good conductivity, you are in luck. Poor ground conductivity usually produces mediocre results with any vertical antenna.

For those interested in making two Lazy-Vs into a directive antenna, I refer you to the articles listed here.

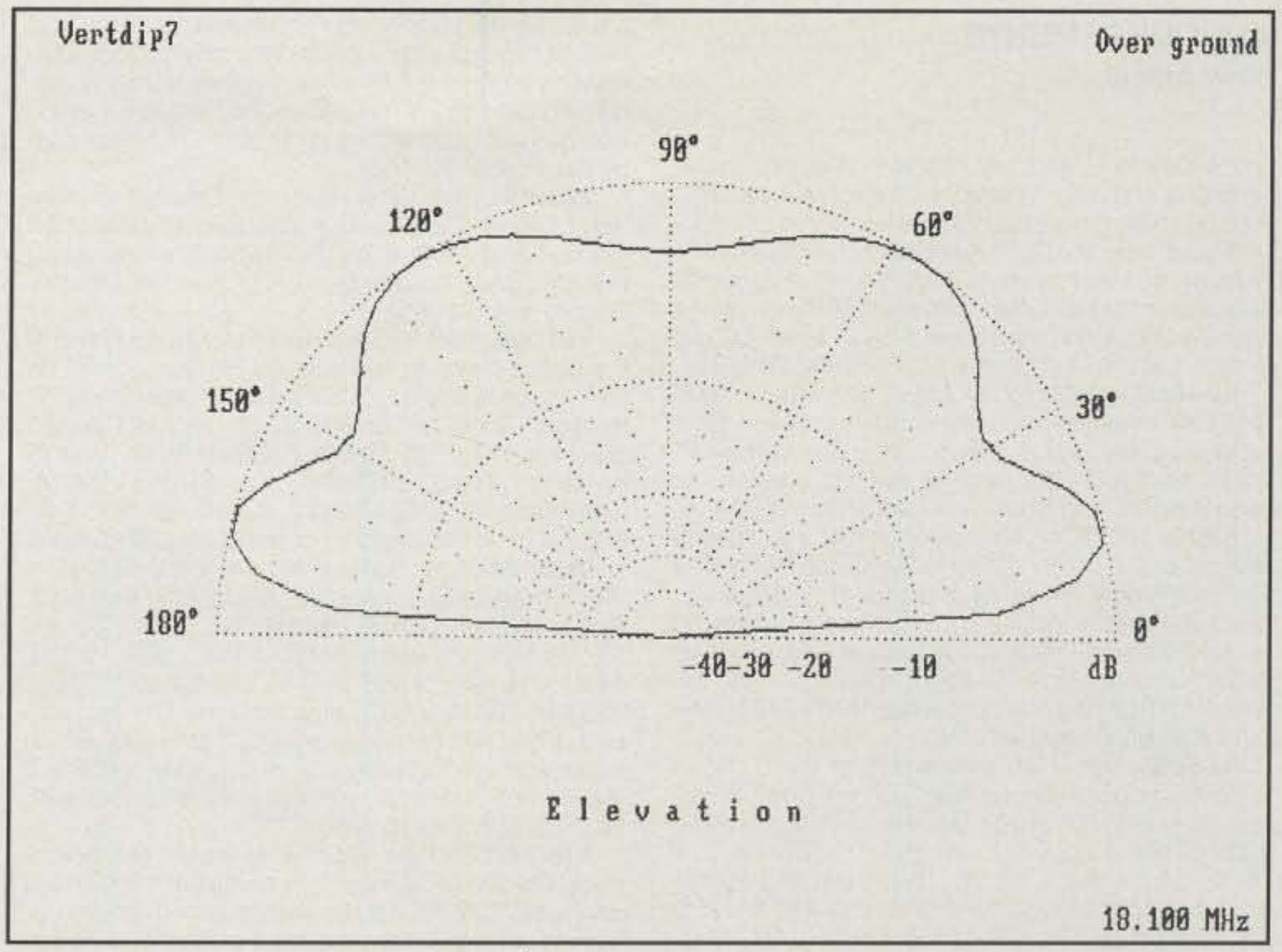

Fig. 9– The 18 MHz pattern of Lazy-V dipole with top about 40 feet above ground.

Further Reading

Here are some articles on using the Lazy-V dipole in antenna arrays.

Christman, Duffy, Breakall, "The 160 Sloper System at K3LR," *QST*, August 1994, pp. 36–38.

Pietrazewski, "7 MHz Sloper System," *The ARRL Antenna Book*, 1991, pp. 4–12 to 4–14.

Mitchell, "The K8UR Low-band Vertical Array," *CQ*, December 1989, pp. 42–46.

Leo, "The Lazy-V Array—An Antenna To Consider," *QST*, February 1995, p. 67.

Margelli, "Credit Where Credit is Due," *QST*, May 1995, p. 86.

Moxon, *HF Antennas For All Locations*, RSGB, 2nd edition, 1993, pp. 227–230.

Thank You

In the April column I announced that I would no longer write this column for *CQ* on a monthly basis but would from time to time contribute a column on some subject I thought was of general interest. This is the first.

I was pleased and thankful for the letters some of you sent me. I appreciate them more than you know. The past months have been difficult, as my XYL, Sunny, passed away, leaving a void in my life. Your letters helped fill that void. Thanks to Irving Morris, W2GMT; Ed Cartotto, W6ZZN; Rick Harmon, KK5BR; Jack Bennett, W8WEN; Rod Newkirk, W9BRD; Doug DeMaw, W1FB; Rick Littlefield, K1BQT; Terry Littlefield, KA1STC; George Goldstone, W8AP; Craig Clark, NX1G; Stu Cowan, W2LX; Vic Persson, SM5KP; George Papalias, W6GBA; Bill Hadgius, N5FIH; Bob Boehmig, W4SJS; Rod Holtz, K5BGB; Bradford Williams, KE7IP; Philip DeJarlais, WØJHS, Wm. J. Byron, W7DHD; Harold Ort, N2RLL; Paul Vaughn, WA4FST; John Clark, WF3Y; Ray Gregson, W6EMT; Al Bry, W2MEL; Don Lynch, W4ZYT; and John Monroe, W7KCN. Many thanks.

73, Bill, W6SAI

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ANNOUNCEMENTS

(From page 6)

and 14045 kHz, and 146.715 MHz. For certificate, send QSL and 8.5 × 11 SASE to Columbia Area ARC, P.O. Box 574, Columbia, PA 17512.

3-land, from the Schuylkill County Fair, Schuylkill, Pennsylvania; Schuylkill ARA (S.A.R.A.); Aug. 6–12; operation in the Novice and General subbands phone and CW. For a certificate, send SASE to N3ILC, Ed Brennan, 520 Spring Garden St., Pottsville, PA 17901.

KB4ALC (KB4**A**merica **L**oves **C**orvettes), from National Corvette Homecoming, Bowling Green, Kentucky; Aug. 31–Sept. 4; low end of the General bands, 7.230, 14.230, 21.305, and 28.305. For a certificate send your QSL and a business-size SASE to KB4ALC.

K5QQ, from 50th year celebration of V-J Day and reunion of the 509th US Army Air Corps Wing, The National Atomic Museum, Kirtland AFB, Albuquerque, New Mexico; Aug. 5–11; in General phone band on 15, 20, and 40 meters. Address all QSL requests to the National Atomic Museum Special Events Station, P.O. Box 6552, Albuquerque, NM 87197-6552 (an SASE will be appreciated).

AC5BI/5, from 64th anniversary of the "LUM 'N ABNER" program, the historic "Jot 'em Down Store" and Museum, Pine Ridge, Arkansas; Ouachita ARA; 1300–2200Z Aug. 3–5; lower 25 kHz of the General phone bands of 75, 40, 20, 15 meters, and 28.435 MHz. For special QSL send QSL and #10 SASE to Jack Brewer, AC5BI, 268 Polk 36, Hatfield, AR 71945.

N5OKV, from National Aviation Week, Morgan City, Louisiana; Bayouland Emergency ARS (BEARS); 1900Z Aug. 19 to 0100Z Aug. 20; on 10 meters and general portion of 20 and 40 meters. QSL to Box 228, Berwick, LA 70342.

W7AIA, from Northwest Antique Aircraft Fly-in, Evergreen Flying Field, east of Vancouver, Washington; Clark County ARC; Aug. 19 and 20; lower portion of the General bands on the 80, 40, 20, and 15, HF bands, and 2 meters, 146.52 for local contacts. For certificate/QSL, send a #10 SASE to CCARC, P.O. Box 1424, Vancouver, WA 98668.

WB8LLY, from Erie County Fair, Huron, Ohio; Firelands ARC; 1500–2400Z Aug. 8 to Aug. 13; operation in General 40, 20, 15, and 10 meter subbands. For certificate, send QSL and 9 × 12 SASE to FARA, P.O. Box 442, Huron, OH 44839.

K8DD, from commemoration of the 61st Annual Conference of Associated Public Safety Communications Officials International, Inc. (APCO), at location of original Detroit Dispatch, Detroit, Michigan; the Michigan Chapter of APCO; 400Z Aug. 12 to 0200Z Aug. 13, and 1400Z Aug. 13 to 0200Z Aug. 14; SSB 3.910, 7.272, 14.272, 21.312, 28.393 (CW on request). For unique QSL, send QSL and business-size SASE to Detroit Dispatch Special Events Station, Box 611230, Port Huron, MI 48061-1230.

KI8W, from Islands of the Great Lakes '95 Expedition, Marion Island in West Grand Traverse Bay, Michigan; Cherryland ARC; 1400–2359Z Aug. 5; from 7220 to 7230 kHz SSB and 7030 to 7040 kHz CW. For certificate, send QSL and 9 × 12 SASE to Brian Cox, WA8QAF, P.O. Box 119, Acme, MI 49610-0119.

KA8GOH, from 33rd Annual Tyler County Fair, Middlebourne, West Virginia; Tyler County ARC; 1500–2200Z Aug. 11 and 12; lower portion of General 40 and 20 meter phone bands, 147.360 repeater, also statewide DAREN packet 145.69. For certificate send QSL and 9 × 12 SASE to TCARC, P.O. Box 287, Middlebourne, WV 26149.

W9WK, from 5th annual "Picnic Ham," Menomonee Park, Lannon, Wisconsin; Milwaukee A.R.E.S.; Aug. 4 –6; General phone and CW bands on 75, 40, 20, 15, and 10 meters. For certificate, send QSL and 9 × 12 envelope with 2 units of postage to W9WK, c/o John Leekly, 757 N. Broadway, Suite 306, Milwaukee, WI 53202.

WAØQIT, from 48th Annual Duluth International Folk Festival, Bayfront Park, Duluth, Minnesota; Doug, KB9IES, and Les, WAØQIT; 1600–2100Z Aug. 5; on 14.255 MHz. Send QSL with 9 × 12 SASE or #10 envelope for folded certificate to ARS—WAØQIT, 123 S. 65 Avenue, W., Duluth, MN 55807.

PA6AMS, PA6TER, PA6DAM, from Sail 1995 Amsterdam, The Netherlands; de radioclub Amstelland; 0800–2000Z Aug. 10–14; on HF, VHF, and UHF. For a full-color certificate, contact all three stations and send a request plus a photocopy of your log. SWL stations report the PA6 station and its opposite station. Enclose $6 US (no IRCs or checks) to PA3AGT, Rob de Visser, Gloriant straat 17, I055 CV Amsterdam by September 30, 1995.

VE3VHH, from 131st Haliburton County Fair, Minden Ontario, Canada; the amateurs of Haliburton County; Aug. 19 and 20; on 14.250. For QSL send QSL and SASE to Wally Bunn, P.O. Box 392, Minden, Ontario, Canada K0M 2K0.

VE3CNE, from 50th anniversary of the founding of the United Nations, International Pavilion, Exhibition Park, Toronto, Canada; VE3CNE Committee; Aug. 18 through Labor Day; on 80, 40, 20, and 15 CW and SSB. For more info contact Geoffrey Smith, VA3GS on packet, VA3GS@VE3YRA; or write to the VE3CNE Committee, P.O. Box 28588, Aurora, Ontario L4G 6S6. QSL will be sent to all contacts via QSL Bureau.

VI5ØPEACE, to honor those who lost their lives in WW II, Hervey Bay, Australia; the Hervey Bay ARC; Aug. 1 through Oct. 31; on 160, 80, 40, 30, 20, 17, 15, 12, 10, 6, 2 meters; 1.820, 3.615, 7.058, 10.150, 14.215, 18.120, 21.195, 24.945, 28.580, 50.110 MHz and 144.100 MHz SSB, plus the usual CW frequencies. US$5 will help with printing costs and airmail return postage for the award, or QSL only, SASE or 1 IRC, to QSL Manager, HBARC, Inc., P.O. Box 829, QLD 4655, Australia.

KBØXP/125, from 125th anniversary of Stanton, Iowa; Stanton ARS; Aug. 4–6; middle of the General phone and CW subbands. Special award notation for vintage or homebrew contacts. For certificate which confirmscontact and entitles the holder to a free cup of coffee in Stanton, send QSL with contact number and 9 × 12 SASE to: STARS, Box 98, Stanton, IA 51573.

WØMME, from Midwest Old Threshers Reunion, Mt. Pleasant, Iowa; Mt. Pleasant ARC; Aug. 30–Sept. 4; in General portions of 80–10 meter phone bands. For QSL, send SASE to Dave Schneider, WDØENR, 1675 Old Highway 34, Mt. Pleasant, IA 52641.

NØPGE, from dedication of the Alcove Springs site along the Oregon Trail, Marysville, Kansas; Marshall County ARC; 1800–2200 Aug. 13; General phone subbands on 20 and 40 meters. For certificate, send QSL and 9 × 12 SASE to Dave Crawford, NØPGE, 604 Chestnut, Blue Rapids, KS 66411.

Ø-land, from 11th Annual Trainfest, Milbank, South Dakota; northeastern SD amateurs; 1400–0200Z Aug. 12–13; General phone 20, 40, and 80 meter bands and Novice 10 meters. For certificate send QSL and 9 × 12 SASE to Jim Thomas, KAØUEQ, 606 S. Sixth Street, Milbank, SD 57252.

• The following hamfests, etc., are slated for Aug.:

Aug. 4–6, **WIMU '95**, Virginian Hotel, Jackson Hole, Wyoming. For info send SASE to Chairman, Warren (Rev) Morton, 1341 Trojan Drive, Casper, WY 82609, or call 307-235-2799. (Exams.)

Aug. 5, **Jefferson County ARC Hamfest**, Clayton Recreation Park Arena, Clayton, New York. For info send SASE to Thomas R. Grant, N2KPJ, Jefferson County RAC, P.O. Box 523, Brownville, NY 13615.

Aug. 5, **5th Annual Columbus Hamfest**, Aladdin Shriners Facility, Columbus, Ohio. Contact Jimmy Caines, KB8KME, 1056 Erickson Ave., Columbus, OH 43227 (614-235-4506 eves/weekends). (Exams.)

Aug. 5, **Annual North Jersey Hamfest**, National Guard Armory, Riverdale, New Jersey. Contact Bernie, WB2YOK, fax/voice 201-584-5399 (24 hours); or Steve, KF2TI, on-line KF2TI@AOL.COM

Aug. 5, **Porter County Hamfest and Computer Expo**, Porter County Expo Center, Valparaiso, Indiana. Call Rich, N9QLQ, 219-762-0484; or send SASE to PCARC Hamfest, P.O. Box 1782, Valparaiso, IN 46384-1782.

Aug. 5–6, **Spokane Hamfest**, University High School, Spokane, Washington. Contact JoAnn Gemmrig, KA7SUZ, 509-928-1808, fax 509-921-6912, or write 6812 E. Third, Spokane, WA 99212. (Exams.)

Aug. 5–6, **Greater Jacksonville Amateur Radio & Computer Show**, Osborn Convention Center, Jacksonville, Florida. Contact Greater Jacksonville Hamfest Assn., P.O. Box 27033, Jacksonville, FL 32205 (904-350-9193). (Exams.)

Aug. 6, **Annual Land of Lakes Angola Hamfest**, Steuben County 4-H Fairgrounds, Crooked Lake, Angola, Indiana. SASE to Sharon Brown, WD9DSP, 905 W. Parkway Dr., Pleasant Lake, IN 46779. (Exams.)

Aug. 6, **Hamfesters Radio Club's 61st Annual Hamfest/Computer Festival**, Will County Fairgrounds, Peotone, Illinois. Send SASE to John Fleming, 13800 Division St., Lot 215, Blue Island, IL 60406 (708-489-5872).

Aug. 6, **Wellesley ARS Flea Market & Tailgate**, Pepsico Pavilion, Babson College, Wellesley, Massachusetts. Contact Barbara Holdridge, N1ICQ, 107 Church Street, Westwood, MA 02090 (617-329-2628), or Gerry Driscoll, NV1T, 107 Church Street, Westwood, MA 02090 (617-444-2686). (Exams.)

Aug. 6, **MidAtlantic ARC Hamfest,** Bucks County Drive-In, Warrington, Pennsylvania. Contact MARC, P.O. Box 352, Villanova, PA 19085; or Bob, WA3PZO, 215-624-4034 evenings, or packet @WB3JOE.PA or Bjosuweit@aol.com.

Aug. 11–13, **4th Annual Sky High Hamfest**, Silver Star Mountain Resort, Vernon, BC Canada. Contact North Okanagan Radio Amateur Club, P.O. Box 1706, Vernon, BC Canada V1T 8C3 (1-604-542-9362; fax 1-604-542-2362).

Aug. 12, **Northwoods Hamfest**, Sugar Camp Town Hall, north of Rhinelander, Sugar Camp, Wisconsin. Contact Mary Berger, NS9Q, 367 Lois Street, Rhinelander, WI 54501 (715-362-9296). (Exams.)

Aug. 12, **Finger Lakes Hamfest & Computerfest**, Dryden High School, Dryden, New York (near Ithaca). Call Richard Spingarn, AA2UP, 607-387-5251 (before 10 PM). (Handicapped accessible; exams.)

Aug. 12, **Chanute Area Hamfest**, Chanute National Guard Armory, Chanute, Kansas. Call (evenings) Jerry Young at 316-431-3268, Charlie Ward at 316-431-6402, or Ted Nantz at 316-537-6001.

Aug. 12, **Tri-State ARA Hamfest and Computer Show**, Cabell-Midland High School, Ona, West Virginia. Call Georgia Overby, KA8QME, 304-522-1811. (Exams.)

Aug. 12, **Amateur Electronics Swapfest**, National Guard Armory, South Dakota State Fairgrounds, Huron, South Dakota. Contact Lloyd Timperley, WBØULX, P.O. Box 205, Huron, SD 57350 (605-352-7896 eves.). (Exams.)

Aug. 12, **Western Illinois Ham Radio and Computer SwapFest 1995**, Eagles Alps Grounds, Quincy, Illinois. Contact Randy Jackson, N9REY, 217-223-7226. (Exams.)

Aug. 12–13, **CCA Convention/Dinner Event/Hamfest**, Long Branch Motor Inn, Cedar Rapids, Iowa. Contact Tom Vinson, NYØV, 319-393-8087; or Rod Blocksome, KØDAS, 319-393-8022.

Aug. 12–13, **Paulding Hamfest & Sat. Night Fleamarket,** Paulding County Fairgrounds, Paulding, Ohio. Contact Jerry Rhodes, 419-399-4507. (Exams, preregistration only, call KA8IAF, 419-795-5763.)

Aug. 13, **St. Cloud Radio Club Swapfest**, Whitney Senior Center, St. Cloud, Minnesota. Contact WØSV, P.O. Box 141, St. Cloud, MN 56302, or packet WØSV@NFOH.#CMN.MN.USA.NOAM. (Exams.)

Aug. 13, **1995 Hamfest**, Career Institute of Technology, Easton, Pennsylvania. Call Chuck Drake, KD3SQ, Hamfest Chairman, 610-866-4714; or the DLARC answering machine 610-820-9110. (Handicapped accessible; exams.)

Aug. 13, **Charlotte ARC Hamfest and Computer Fair**, Roll-A-Round Skate Center, Charlotte, North Carolina. Call Buck Escott, WB4OTP, 704-522-4971, ext. 3330.

Aug. 13, **Central Kentucky ARRL Hamfest**, Western Hills High School, Frankfort, Kentucky. Contact Bill DeVore, N4DIT, 112 Brigadoon Parkway, Lexington, KY 40517 (606-257-3343 days; 606-273-8345 eves.). (Exams.)

Aug. 18–20, **1st Annual Amateur Radio Industry Group National Convention**, Von Braun Civic Center and Hilton Hotel, Huntsville, Alabama. Call 205-534-7175; or write to Huntsville Hamfest, P.O. Box 12534, Huntsville, AL 35815.

Aug. 19, **The Brantford ARC Fleamarket**, Burford Fairgrounds, Burford, Ontario. Contact Richard La Rose, VE3RLX, 153 Dunsdon Street, Brantford, ON N3R 6N3 (519-752-2437).

Aug. 19, **W7DG Ham Radio, Computer & Electronics Swapmeet**, Cowlitz County Fairgrounds, Longview, Washington. Contact LCARA Swapmeet, P.O. Box 906, Longview, WA 98632, or call Bob, KB7ADO, 360-425-6076 eves.

Aug. 19, **BARA Hamfest & Fleamarket**, Regional Airport (E.A. Link Field), Binghamton, New York. Call John Sarpolis, N2SOY, 607-748-4951; or write to BARA, P.O. Box 853, Binghamton, NY 13902-0853.

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Aug. 20, **Union County ARC Hamfest & Computer Show**, Broadway Ohio Community & Civic Complex, near Columbus, Ohio. Contact Gene Moore, 24461 Claibourne Road, Marysville, OH 43040 (513-246-5943). (Exams.)

Aug. 20, **Tailgate Electronics, Computer & Amateur Radio Fleamarket**, Albany and Main Street, Cambridge, Massachusetts. Call 617-253-3776.

Aug. 20, **Delmarva Hamfest**, Delaware Technical and Community College, Georgetown, Delaware. Write to Delmarva Hamfest, Route 2, Box 244G, Georgetown, DE 19947. (Exams.)

Aug. 20, **Warren ARA 1995 Hamfest**, Trumbull Branch Campus, Kent State University, Warren, Ohio. Contact Al VanSlyke, N8IKX, Warren ARA Hamfest, P.O. Box 809, Warren, OH 44482 (216-889-3378). (Exams.)

Aug. 25–26, **4th Annual New Orleans International DX Convention**, the Royal Sonesta Hotel, New Orleans, Louisianna. Contact Michael Mayer, W5ZPA, 5836 Marcia Ave., New Orleans, LA 70124 (504-283-4143 days; fax 504-524-2129). For hotel reservations call 504-586-0300 and mention the convention.

Aug. 25–27, **Eastern VHF-UHF Conference**, Quality Inn & Conference Center, Vernon, Connecticut. Contact Rae Bristol, K1LXD, 328 Mark Dr., Coventry, CT 06238 (203-742-8650).

Aug. 26, **Duke City Hamfest**, The New Mexico Army National Guard Armory, Albuquerque, New Mexico. Call 505-821-2771; Internet queries via: WA5WHN@rt66.com. (Exams.)

Aug. 26, **Mohawk ARC 3rd Annual Amateur Radio, Computer Fleamarket**, Mohawk Drive-in Theater, Gardner, Massachusetts. Call John, WF1L, at 508-249-5905 from 4–9 PM; Paul, N1IPG, at 508-632-9432 from 6–10 PM; or Tom, N1KKY, at 508-249-4521 from 5–9 PM.

Aug. 26, **40th RAGS Hamfest**, Academy Green American Legion, Syracuse, New York. Call 315-469-0590; or write to RAGS, P.O. Box 88, Liverpool, NY 13088. (Handicapped accessible; exams.)

Aug. 26, **SCARS Hamfest**, Somerset County 4H Center, Bridgewater, New Jersey. Call Eric, NW2P, at 908-753-8290; or write to SCARS, P.O. Box 742, Manville, NJ 08835.

Aug. 26, **4th Annual Ham/Computer 'Fest**, Manion Town Park, Chaffee, New York. SASE for tickets and map to Mike Wrona, 139 Greenmeadow Drive, West Seneca, NY 14224.

Aug. 26, **Bridgewater SCARS Hamfest**, Somerset County 4H Center, Bridgewater, New Jersey. Call Eric, NW2P, 908-753-8290; or write to SCARS, P.O. Box 742, Manville, NJ 08835.

Aug. 26–27, **14th Annual MARC Campfest and Swapfest**, Quaker Ridge Camp, 6.5 miles north of Woodland Park City Center, Colorado. Advance registrations to camp essential. Write to MARC at P.O. Box 1012, Woodland Park, CO 80866-1012; or call Don Chamberlain, AAØNW, at 719-687-3692; or Fred, NØPKA, or Patty, NØPSD, at 719-687-9727. Send SASE for event information sheet.

Aug. 27, **Five County Amateur Radio & Computer Swap 'N Shop**, Shiawassee County Fairgrounds, Corunna, Michigan. Call Jan at 517-893-3475.

Aug. 27, **Livingston County HamFair**, Fowlerville Fairgrounds, Fowlerville, Michigan. Contact L.A.R.K., P.O. Box 283, Howell, MI 48843, or call 517-548-1412.

Aug. 27, **Short Mountain Repeater Club Fleamarket**, Cedars of Lebanon State Park, Lebanon, Tennessee. Contact Thomas Page, AD4AI, P.O. Box 2741, Lebanon, TN 37088-2741 (615-449-5610).

Aug. 27, **Woodstock, IL Hamfest & Computer Show**, McHenry County Fairgrounds, Woodstock, Illinois. Contact Tri-County ARG, P.O. Box 3107, Skokie, IL 60077-6107, or call Robert, N9KXG, 708-658-1678.

Aug. 27, **Chicago ARC Summer Hamfest**, Oak Brook Terrace, Illinois. For info and reservations, call 312-545-4740 or 545-3622, leave message on 312-666-1606, or write to CARC, 5631 W. Irving Park Rd., Chicago, IL 60634.

Aug. 27, **Yonkers ARC Hamfest/Computerfest '95**, Yonkers Municipal Parking Garage, Yonkers, New York. Contact Jim, N2ONM, 914-969-5182.

Aug. 27, **Tri-State ARC Hamfest**, Matamoras Airport Park, Matamoras, Pennsylvania. Contact Paul, KD3L, 717-491-4808 after 1 PM, or Bob, KB2TBY, 914-856-5571 after 5 PM.

Sept. 8–10, **MARM Hamfest & Fleamarket**, Manitoba Agricultural Museum, Austin, Manitoba. Contact Dave Snydal, VE4NX, 25 Queens Cres., Brandon, MB R7B 1G1 (204-728-2463).

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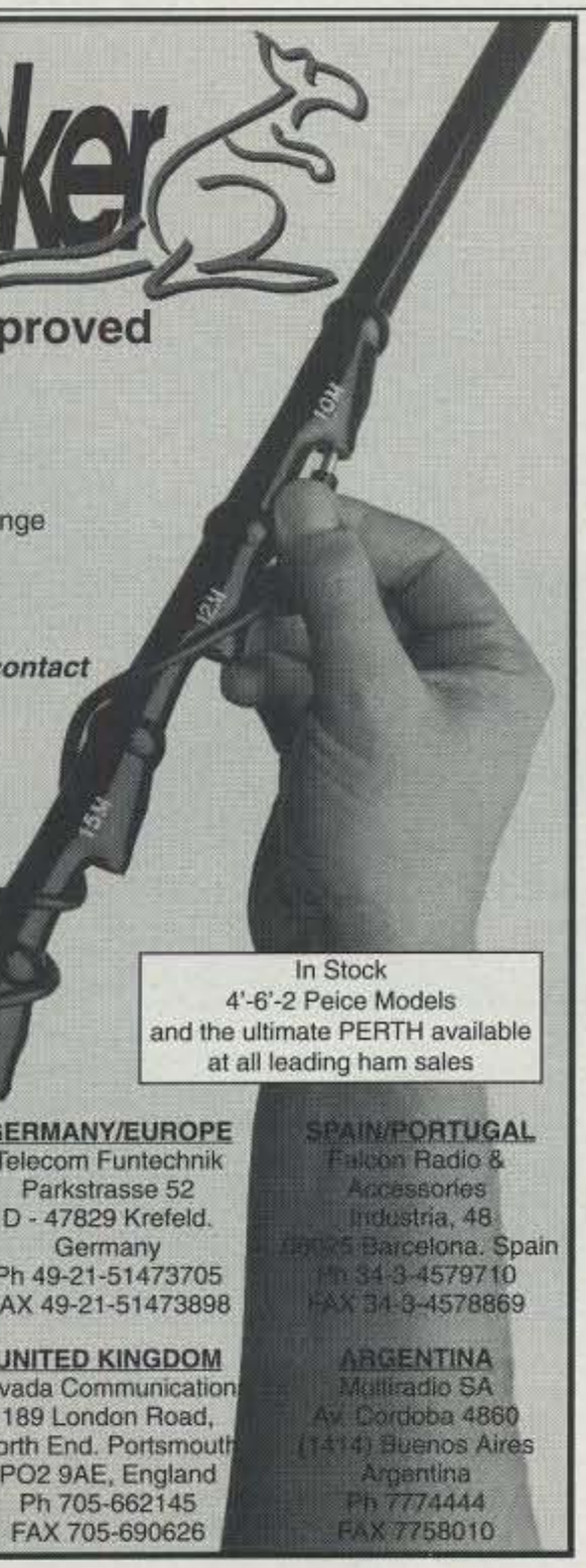

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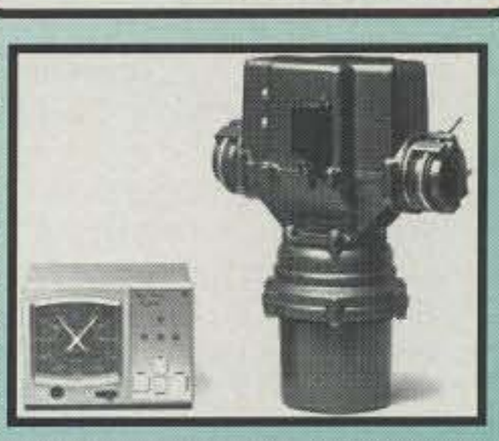

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VHF PLUS

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ALL ABOUT THE WORLD ABOVE HF

Lessons Learned From My Worst-Ever Rover Operation

VHF PLUS CALENDAR

July 27–30	Central States VHF Society Conference, Colorado Springs, Colorado. *(See last month's column for details.)*
Aug. 5–6	ARRL UHF contest, 1800 UTC 5 Aug. to 1800 UTC 6 Aug.
Aug. 6	Poor EME conditions.
Aug. 7	Lowest Moon declination.
Aug. 10	Full Moon.
Aug. 12	*Perseids* meteor shower predicted peak.
Aug. 13	Good EME conditions.
Aug. 19–20	First weekend of the ARRL 10 GHz Cumulative Contest, 0800–2000 local time, both days.
Aug. 20	Highest Moon declination and apogee. Very poor EME conditions.
Aug. 25–27	Eastern VHF/UHF Society Conference. *(See text for details.)*
Aug. 26	New Moon.
Aug. 27	Poor EME conditions.

**EME conditions courtesy W5LUU.*

My worst-ever rover operation began on 19 April and lasted a week. I traveled to one location in a very confined area in downtown Oklahoma City. I parked my conversion van across the street from the A. P. Murrah Federal building. From there I operated only one band, 2 meters, and then only on FM. It was not a contest, but it was a test of my preparedness.

Right after the bomb exploded I knew that I was in for a long-haul operation. I hadn't been keeping my radios in the van, because at the time I lived in an area in which equipment—and even whole vehicles—sometimes mysteriously disappear (once someone tried to "disappear" my vehicle, but the car alarm woke me and scared off the would-be larcenist). To the extent of my not having my radio, I was unprepared. I had to go by my home to pick up my radio and antenna before getting in place at my rover QTH.

I realized, however, just how prepared I am as a rover. I had plenty of coax (not needed), power supplies (again, not needed), linear amps already hooked up (needed occasionally), coax connectors, headphones, spare antennas, cigarette lighter connectors, coax jumpers, extension cords, jumper cables, and supplies for the engine such as oil, water, antifreeze, etc.

I participated in a directed net where a high volume of traffic was being passed. Contacts were brief and accurate. Patience was mandated to be high. Numerous times I found myself explaining my operation to all kinds of nonham people who were in the area. Additionally, my duty—that of working for the Salvation Army—required me to constantly interface with them and their needs in the performance of my jobs.

I had a swing shift operator, Carol King, K5CPZ. We traded off sleeping in the back of the van and working the radio. The engine of the van ran all night on several of the nights in order to keep the van warm. Thanks to the U.S. Air Force, a couple of tanker trucks were positioned nearby for refueling of emergency vehicles (at the time mine was definitely an emergency vehicle).

I learned just how reliable and useful my equipment was in the operation. The first day I used a mobile FM radio. Because of the sheer volume of RF energy in the confined area of the perimeter, its front end was continuously swamped with RF cross talk. A day into the operation I switched to my Yaesu FT726 radio and it worked great. While cross talk was still prevalent, I was able to squelch it out.

What lessons did I learn from this worst-ever rover operation? I learned that in the van I had equipment ready to go that I was able to almost immediately put to use. I learned that I still need to find a way of stashing a radio, however, so as not to make that necessary trip home. I found that the operating experience of working contests prepared me for the operating required of me during the emergency. I learned that even in the most stressed out situation, one can work with other human beings to make an objective happen.

I hope that I never, ever, have to repeat this rover operation. However, I know that because of past experience, I can do so.

Finally, I think of how the fun of rover operation has been seriously dampened because of all the controversies surrounding the ARRL rules changes. Perhaps the whole thing should have been left alone. I don't know now because it's too late. I know that the present rules are not working because so many rovers are protesting them.

I sincerely hope that the League's Contest Advisory Committee can come up with a solution that will put the fun back into rovering. If not, then less people will consider rover operations. And maybe sometime when some of these rover operators could be learning valu-

P.O. Box 73, Oklahoma City, OK 73101

Jordan Mash, WB2QLP (left), and Gary Randall, KD4VRZ (right), stopped in Oklahoma City for an eyeball QSO on their way back to Florida from a fishing/grid expedition trip to Colorado. They said they got skunked on both endeavors.

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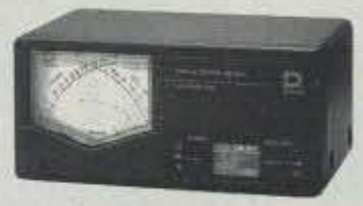

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Current (ICS)	12	14	30	40	5.2
Current (cont.)	9.2	12	24	32	4.2
Ripple(max.)	3mV	3mV	3mV	3mV	3mV
Regulation	1%	1%	1%	1%	2%
Cooling Fan	NO	NO	NO	YES	NO
Size(inch.)	5x4x9	5x4x9	7x6x9	11x5.5x9	6x3x9
Weight (ilbs.)	11	11	18	22	6
Meter	YES	NO	YES	YES	YES

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SS404 - Compact, 40amp supply Auto Switching - 100-117V or 220-240V Input 70 - 132V or 140-264V; crossbar protection. Additional models are available, CALL today!

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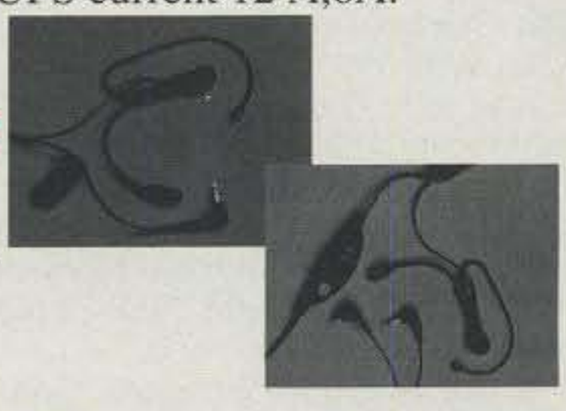
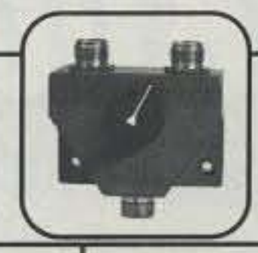


EX600- Earphone Mic for Cellular Phones

EX700- Earphone Mic for Handheld Transceivers with PTT Switch



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	CS201	CS201GH	CS401/401G
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Isolation	60 dB 600MHz	50dB 1 GHz	60dB 300 MHz
Connector	SO239	N	N

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able operating experience that could be used for some sort of an emergency operation, they won't gain this experience because they are no longer actively participating as rovers.

Conference Summaries

Dayton: The Dayton HamVention was extraordinarily good this year. The weather in particular, with the exception of some drizzle on Sunday, was excellent. Friday night's VHF banquet was attended by over 110 VHFers and their families. Due to the increased number of VHF forums, they were spread over two days.

Saturday morning I led off with a discussion of VHF activities in Oklahoma City during the bomb disaster. I was followed by Jim Mitzlaff, WB9SNR, who spoke on the rover issue and proposals under consideration by the ARRL Contest Advisory Committee.

Paul Rinaldo, W4RI, spoke on microwave band sharing and the latest rumors, etc. Rick Campbell, KK7F, spoke on no-tune converters for the microwave bands. Al Katz finished the Saturday forums with a talk on Smith Chart impedance matching.

On Sunday I showed slides of my last year's VHF contest operation in Cuba. I was followed by Terry Littlefield, KA1STC, editor of our sister publication *Communications Quarterly*, who read her husband, Rick, K1BQT's report on new devices. Rick came down with a case of the flu and spent the entire weekend in the hotel room.

Tom Whitted, WA8WZG, spoke on microwave DXing. Joel Harrison, WB5IGF, spoke on VHF/UHF contesting. Paul Wade, N1BWT, spoke on horns, dishes, and lenses. Paul Shuch, N6TX, spoke on amateur radio's role in the search for extraterrestrial intelligence.

West Coast VHF Conference: The 40th annual West Coast VHF Conference was held at the Sheraton Cerritos Hotel over the first weekend of May. Some 260-plus west coast VHFers were in attendance. In all, twelve hams presented forums. In the morning sessions Dave Laag, WA6OWD, spoke on the history of the San Bernardino Microwave Society; Steve Katz, WB2WIK, spoke on coaxial cable and connectors; Dave Glawson, WA6CGR, and Jack Henry, N6XQ, spoke on microwave activity in California; Joe Moell, KØOV, spoke on beginning hidden transmitter hunting; Steve Bell, KD6GRK(?), spoke on CAD for slotted lines; and Scott Bovitz, N6MI, spoke on advanced transmitter hunting.

In the afternoon sessions Gordon West, WB6NOA, spoke on weather facsimile and VHF signal ducting; Tim Marek, NC7K, spoke on 144 MHz EME basics; Gary Frye, W6XJ, spoke on antenna design software; Chip Margelli, K7JA, spoke on EME peanut-whistle stations; Emil Pocock, W3EP, spoke on the future of transoceanic ducting; and Gene Swiech, WB9COY, and Bill Smith, KB6MCU, spoke on VHF/UHF antenna designs.

An ARRL forum followed the technical sessions. Moderated by ARRL Southwestern Division Director Fried Heyn, WA6WZO, it included Art Goddard, W6XD, Southwestern Division vice-director; Jim Von Striver, W6ASL, Spectrum Management Committee member from the Pacific Division; Carl Pagel, N6PVU, Spectrum Management Committee members from the Southwestern Division; David Gutierrez, WA6PMX, Jim Fortney, K6IYK, and Emil Pocock, W3EP, VHF editor for *QST*.

Dave Glawson, WA6CGR, spoke on microwave activity in California and Mexico at the West Coast VHF Conference during the first weekend in May.

I was the banquet speaker. I actually gave two talks. I showed my slides on Cuba and spoke on amateur radio activity in Oklahoma City following the bombing.

On Sunday morning Art Goddard, W6XU, spoke on amateur radio activity in Africa. Sunday afternoon featured a hidden transmitter hunt with Scott Bovitz, N6MI, being the fox.

Ham-Comm: As usual, despite it being contest weekend (ARRL June VHF QSO Party), the microwave forum at Ham-Comm was well attended. Among the participants were Roger Dillion, N5PGH, Al Ward, WB5LUA, Jim Hudson, WA5JAT, and Gerald Handley, WA5DBY.

Current Contests

The annual UHF contest is scheduled for 5–6 August. The contest period is for 24 hours beginning 1800 UTC Saturday. There are several categories for entry. Scoring: Count three points for 222 or 432 MHz contacts, six points for 902 and 1296 MHz contacts, and 12 points for contacts on 2.3 GHz and above. Exchange is your four-digit grid square. Again this year pins, such as those also available in other ARRL contests, are available. The minimum number of contacts necessary for a pin is five. Submit your log by 8 September to the League to be eligible for awards. For complete rules, see July *QST*.

The dates for the first weekend of the eighth annual ARRL 10 GHz cumulative contest are 19–20 August (the second weekend is 16–17 September). The operating times are 8 AM to 8 PM local time each day. The exchange is the *six*-digit Maidenhead grid locator. Scoring is adding the sum of the distances in *kilometers* of each station worked to the sum of each unique callsign worked multiplied by 100. For example, if you work four unique stations (two of which operated from two separate locations)

that are 97, 107, 154, 205, 157, and 147 km apart (for a total of 867 km), then your final score would be 1267 (867 + 400). To be eligible for contest awards, submit your log by 18 October. For complete rules see June *QST*.

Remember, 31 August is the deadline for submitting your logs for the CQ WW VHF Contest. Please send the completed logs to me by that date in order to be eligible for scoring awards. If you need logs and/or entry sheets, send an SASE to *CQ* magazine headquarters right away.

VE3ONT Activity Days

The following is from Michael Owen, W9IP, via the Internet.

"These are the *very tentative* plans for VE3ONT's operation using the Algonquin 46 meter (150 ft.) dish. Please keep in mind that these plans are subject to revision.

"August 19, 1995: 10 GHz only. We plan to conduct echo tests to evaluate Moon reflectivity vs. geometry for the first few hours after Moonrise. After about 08:00 local time we will begin QSOs. This coincides with the 10 GHz contest. QSO operation is contingent upon us locating a 50 watt TWT.

"**ARRL EME Competition:** October 7, 1995—144 MHz; October 8, 1995—50 MHz & 1296 MHz simultaneously; November 4, 1995—144 MHz; and November 5, 1995—432 MHz."

Over 110 VHFers attended the Friday Night banquet at the Barnsider Restaurant during the Dayton HamVention.

Rumored Scores June VHF QSO Party

The following rumored scores are from the Internet courtesy George Fremin, WB5VZL:

Rover: K9JK, 20,465, 12 grids; ND3F, 20,100, 12 grids; NGØX (+K2MM), 13,453, 6 grids; KØDAS, 7,714; KE7NS, 5,250, 4 grids; N1QVE, 2,057; W8CAR, 4 grids.

QRP Portable: KH6CP/1, 71,478; NN9K/Ø, 40,228; W9SZ, 1,856.

Single Op: WA2TEO, 304,000; K1RZ, 233,000; WD8ISK, 206,780; KE8FD, 189,000; AA2UK, 132,000; KN5S, 126,940; K2UOP/8, 116,300; WB2DNE, 109,700; W3ZZ, 90,300; W5KFT (op. WB5VZL) 90,060; K3ZO, 67,500; AA7A, 60,788; KU8U, 57,200; N5RZ, 47,872; KE7GH, 47,854; K8MR, 41,234; KØBI, 38,448; N6PYI, 37,323; K9AKS/6, 30,000; K8MFO, 22,506; N7DB, 21,483; KC7MJ, 20,806; WD8BKM, 19,600; KD6UIH, 18,432; KØGU, 17,982; KK5DK, 15,355; K1FWF, 12,876; KØVM, 11,408; AC1T, 10,350; KC5LCK, 10,200; KF6HI, 9,246; WA7NWP, 4,131;

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KB1GW, 3,243; VE7GBA/3, 2,128; KD4QIO, 1,242; KC7MK, 1,080; AA7BG, 1,014; NZ4K, 779; K5ZD, 583; WB4IUX, 180; VS6BG, 79.

Limited Multi-op: K3MQH, 520,676; KB5IUA, 136,927; W1QK, 85,212; WA4VCC, 61,000; N7CW/6, 55,692; WB6FFC, 25,615; VE6JY, 13,632; NV3Z, 13,207; K3UZY, 11,700.

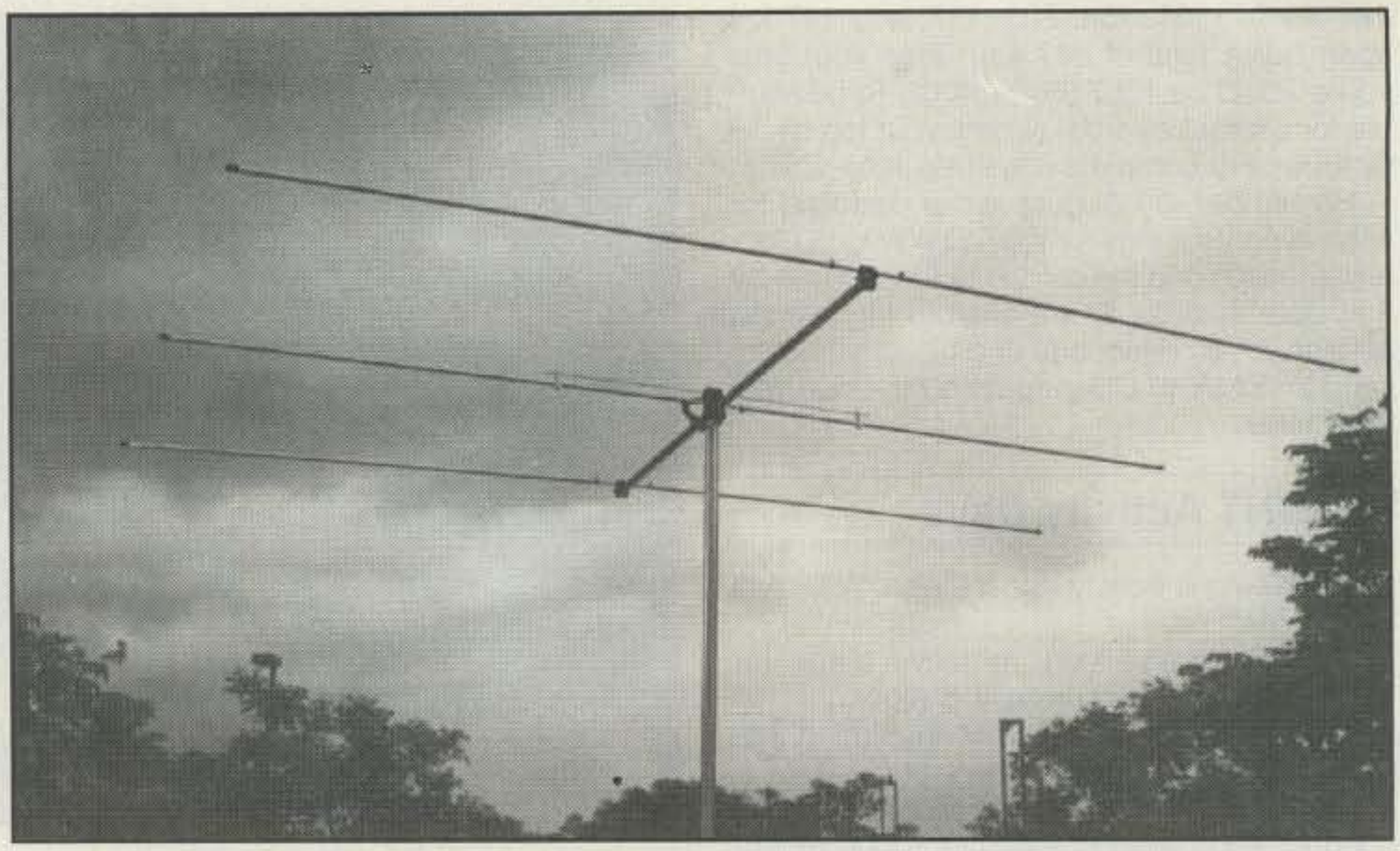
Full Multi-op: N2WK, 1,266,920; W2SZ/1, 1,148,517; W3CCX, 492,862; W4IY, 364,000; WØUC/9, 188,000; KDØDW, 112,000; K1TR, 107,500; W1TKZ, 90,742; AA7NH, 67,500; KA3DSE/6, 56,848.

Comments about the contest indicate that in some places propagation was better than last year and in others it was worse. Terry Baxter, N6CW, operating as VP2ECW, worked seven stations last year and only *three* this year. However, one of the three was D44BC! The other two were V44KAI and V44KAO.

Current Meteor Showers

The big meteor shower for this month is the *Perseids*. As mentioned last month, activity for this shower starts appearing around mid-July. The most intense period is the four days leading up to the predicted peak. There should be several stations operating from rare grids during the peak days. Additionally, if it's in close proximity to the weekend, several operators may get "meteor sickness" (not really) on Friday and stay home from work in order to "work" the shower.

After too many years of trying to report a predicted peak and failing miserably, I am staying away from exact times. Nevertheless, your best bet is usually the early morning hours of 11–13 August. For skeds be sure to check 3818 and 3843 kHz and the VHF reflector on the Internet.



The Swiech Communications COY6M3EL 6 meter 3-element beam is an excellent rover antenna for that band.

Transatlantic Tests: Serge Szpifogel, VE1KG, is looking for skeds for possible transatlantic tests during the meteor shower. If you are interested, you can send him an e-mail message to CLROWE@ac.dal.ca. His phone number is 902-852-2399 and his address is Box 8772, Station A, Halifax, NS Canada B3K 5M4.

IRTS Transatlantic 2-Meter Trophy Rules: The following, from the Internet, is a summary of the rules governing the trophy offered by the Irish Radio Transmitting Society to be awarded to the stations making the first transatlantic contacts by ionospheric reflection on 2 meters.

1. Two-way contact between EU and North or South America in the 144–146 MHz band (NB 146–148 not available in EU).

2. Both stations on land or non-tidal waterways within the respective continental shelves

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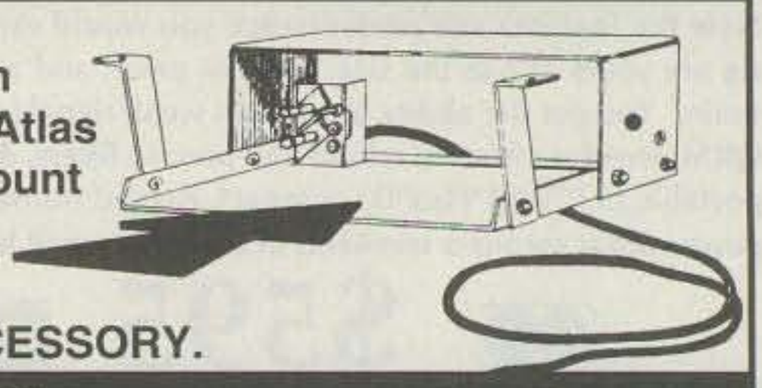

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(effectively excluding Greenland and Iceland).

3. Contact can be by any mode but must be completed within 4 hours via "natural reflectors" within the "atmospheric mantle of the earth" (=1000km, 621 miles). No aircraft, satellites, or EME.

4. To consist of exchange of full callsigns and reports (RS/RST or MS system) and confirmationn 'R' from both stations.

5. Onus of proof lies with claiming stations, who must satisfy a panel established by IRTS. A higher level of proof will be required if the contact arises from skeds rather than if they are random. The former will require recordings from both sides; the latter is likely to require signed statements from operators and witnesses plus declaration of honesty by operators attesting they operated "within the true spirit of amateur radio." Submissions within three months of contact.

6. Stations must be operated within the terms of their license, especially regarding frequency and power.

Current Conferences

The 21st eastern VHF/UHF Society Conference is scheduled for 25–27 August 1995 at the Quality Inn and Conference Center, 51 Hartford Turnpike, Vernon, CT 06066.

The schedule of events is as follows: Friday, 1600–?, hospitality room; Saturday, 0800, registration begins adjacent to the hospitality room; 0840 talks begin, six technical talks and six band sessions covering 6 meters through SHF featuring Ken Neubeck, WB2AMU; Steve Powlishen, K1FO; Frank Potts, NC1I; Steve Kostro, N2CEI; Chip Taylor, W1AIM; Bill Lentz, AA2UK; Hank Lopez, N2MSS; Dr. Paul Shuch, N6TX; Tom Whitted, WA8WZG; and others.

At 1600 pre-amp noise figure measurements will be made (bring your pre-amps). The banquet will be from 1900–2030. Following the banquet will be the traditional microwave trivia quiz, open to all. The door-prize drawing, also open to all, will occur at approximately 2100.

On Sunday there will be a VHF-SHF swap meet and antenna measuring starting At 0800.

Registration: Pre-conference registration before August 20, 1995 can be mailed to: Rae Bristol, K1LXD, 328 Mark Drive, Coventry, CT 06238 (203-742-8650). Regular mail registration is $20; Sunday only registration is $5. Banquet tickets (mail only): Prime rib, $23; stuffed shrimp, $23; chicken capon (scrod, vegetable lasagna available as a substitute), $19.

Registration for the conference at the door will cost $25. Each regular registrant receives a copy of the proceedings. You need not attend the banquet to attend the prize drawings/trivia.

Overnight rates when you mention the Eastern VHF/UHF Society are single and double $51.50, which includes use of facilities (swimming, etc.) and a continental breakfast. A shopping center, movie theater, and amusement area are on-site. Call Lori Torizer at 800-235-4667 for reservations.

On The Air

As of this writing, the big 6 meter days of June were 16, 17, and 18. On 16 June JAs were reported into California (reported by Jun, JR3HED, on the Internet). On 17 June Ron Patterson, WA6VQZ, reported double hop into

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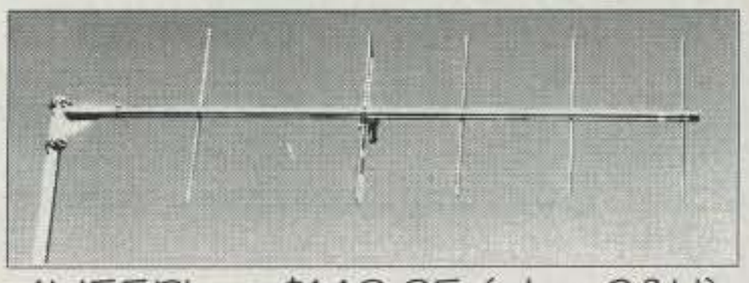

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Features:
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3 fully regulated supplies; 1.5-15V @ 1A, -1.5 to -15V @ 1A or (3-30V @ 1A) and 5V @ 3A Kit XP-620K $49.95

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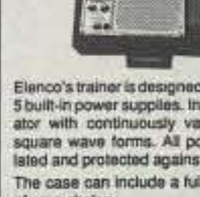

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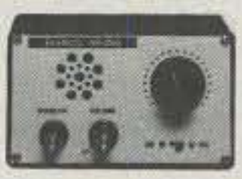

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0508G	1	170	28	15/0.6	Standard
0508R	1	170	28	–/–	Repeater
0510G	10	170	25	15/0.6	Standard
0510R	10	170	25	–/–	Repeater
0550G	5-10	375	60	15/0.6	HPA
0550RH	5-10	375	60	–/–	Repeater HPA
0552G	25-40	375	55	15/0.6	HPA
0552RH	25-40	375	55	–/–	Repeater HPA
144 MHz					
1403G	1-5	10-50	6	15/0.6	LPA
1406G	25	100	12	15/0.6	Standard
1409G	2	150	25	15/0.6	Standard
1409R	2	150	24	–/–	Repeater
1410G	10	160	25	15/0.6	Standard
1410R	10	160	24	–/–	Repeater
1412G	25-45	160	20	15/0.6	Standard
1412R	25-45	160	19	–/–	Repeater
1450G	5	350	56	15/0.6	HPA
1450RH	5	350	56	–/–	Repeater HPA
1452G	25	350	50	15/0.6	HPA
1452RH	25	350	50	–/–	Repeater HPA
1454G	50-100	350	40	15/0.6	HPA
1454RH	50-100	350	40	–/–	Repeater HPA
220 MHz					
2203G	1-5	10-40	6	14/0.7	LPA
2210G	10	130	20	14/0.7	Standard
2210R	10	130	19	–/–	Repeater
2212G	30	130	16	14/0.7	Standard
2212R	30	130	15	–/–	Repeater
2250G	5	220	40	14/0.7	HPA
2250RH	5	250	40	–/–	Repeater HPA
2252G	25	220	36	14/0.7	HPA
2252RH	25	250	36	–/–	Repeater HPA
2254G	75	220	32	14/07	HPA
2254RH	75	250	32	–/–	Repeater HPA
440 MHz					
4403G	1-5	7-25	4	12/1.1	LPA
4410G	10	100	19	12/1.1	Standard
4410R	10	100	18	–/–	Repeater
4412G	20-30	100	19	12/1.1	Standard
4412R	20-30	100	18	–/–	Repeater
4448G	5	100	22	12/1.1	HPA
4448R	5	100	22	–/–	Repeater HPA
4450G	5-10	175	34	12/1.1	HPA
4450RE	5-10	175	34	–/–	Repeater HPA
4452G	25	175	29	12/1.1	HPA
4452RE	25	175	29	–/–	Repeater HPA
4454G	75	175	25	12/1.1	HPA
4454RE	75	175	25	–/–	Repeater HPA

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144 MHz	1420B	.5	24	BNC
144 MHz	1420N	.5	24	N
220 MHz	2220B	.5	22	BNC
220 MHz	2220N	.5	22	N
440 MHz	4420B	.5	18	GNC
440 MHz	4420N	.5	18	N
1.2 GHz	1020B	.9	14	BNC
1.2 GHz	1020N	.9	14	N

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CIRCLE 114 ON READER SERVICE CARD

The Schuylkill Amateur Repeater Assn. celebrated its 20th anniversary in March. Since 1975 the association has provided amateur radio operators in Schuylkill county and surrounding communities in Pennsylvania with repeater coverage, and has been involved in numerous community activities and pub;lic services. Charter members and officers pictured: Bottom row (left to right) K3KVK, charter member; KA3FUL, president; K3SLJ, charter member. Top row (left to right) N3HHG, treasurer; N3HHH, vice-president; WY3K, secretary; N3LBM, public relations officer.

New England. Also, on 17 June Dave, N7DB, reported that Alaska was being worked on the west coast. Additionally, Ralph, N5RZ (DM81), worked Ned, AA7A (DM43), on 2 meters FAI.

On 18 June several stations on the east coast (from Canada to Florida) reported European QSOs on 6 meters. Among the second-hand reports was that Lefty, K1TOL, made in excess of 60 QSOs.

Svalbard EME Activity Report

The following was submitted over the Internet by Stefan, LAØBY/JWØBY. "The Svalbard EME activity was terminated as scheduled on June 6, with much luck on the final day.

"By mistake LA9NEA and IK5UBM were scheduled for the same time, and I started off with calling IK5UBM, who came through quite well. In the middle of the sked LA9NEA came out of the noise with O's and I switched over to him. We finished within a few minutes and I returned to IK5UBM, who, perhaps slightly confused, finally concluded with RRR and even 73's. Thereafter I had a sked with EI4DQ, who was almost indiscernible as in many previous skeds. After 10 minutes IK5UBM called me again, stronger than ever, and exactly on EI4DQ's frequency. So I just had to work him a second time to get him off the frequency. Suddenly EI4DQ came up very nicely with O's. We completed passing 73's and two periods later the moon had disappeared for me. This made three new stations and a new country in the final hour! Rather satisfied, I dismantled the antenna system and the equipment on the following day.

"Operating 2 meters EME from a location in the extreme north has been an interesting experience. The conditions were unfavorable on most weekends in 1995. High absorption often kept the signals, particularly from smaller US stations, within the noise. The window to the US West Coast has been very limited due to some local noise.

"In 1995 the following new stations were worked by JWØBY: WØRWH, JA9BOH, VK3AMZ (first VK-JW), DK9OY, DF7KF, LU7DZ (first LU-JW), W7HAH, WG8Q, ZS6ALE (first ZS-JW), W9QXP, UT4EQ, IK1FJI, DK4TG, HB9JAW, F6IRF (first F-JW), W4ZD, K9MRI, N7BNJ, S52LM, K7CA, S51ZO, EA2AGZ, N4GJV, W8WN, UT5EC, SV1BTR (first SV-JW), OZ1HNE, WP4G (first KP4-JW), VE3BQN, JL1ZCG, 9H1BT (first 9H-JW), JA2JRJ, HB9SUL, WA2GSX, W2CRS, WA2PNW, K2LME, HB9DGX, WA6PEV, CT1WW (first CT-JW), DK2PH, KN6M, F9HS, WØHP, PA3CEG, PA3EPD, LA8KV, NØAKC, AF9Y, AA4FQ, W9HLY, K8BHZ, LA9NEA, IK5UBM, and EI4DQ (first EI-JW).

"The final score was 125 initials, 25 big squares, 100 grids, 33 DXCC and 22 US states. All continents were reached within two days in January. All contacts in 1995 were made after the antenna was damaged and reduced to 2 × 17-ele and 2 × 13-ele.

"The 4-Yagi antenna system survived the harsh environmental conditions, with not more than a few elements blown off. Only in the beginning I had minor start-up trouble with the preamplifier. Thereafter everything behaved very reliably. I also did not miss any sked because of bad weather, even though I had been close to.

"Most of the scheduling was done through Lionel, VE7BQH, and Larry, K1MNS, whom I would like to thank very much for their efforts. Lionel frequently passed my sked list over the

Say You Saw It In CQ

Internet, which was really helpful. Due to time or propagation constraints I would not have been able to check into the 2 meter EME Net myself very often.

"I have no determined plans to get back on 2 meters EME in the near future. But since the equipment (or at least a part of it) will remain available, there may come up opportunities to operate again from the mainland. I would like to thank all those I worked as well as those who tried unsuccessfully.—Stefan, LAØBY/JWØBY."

Simple 6 Meter Beam

While I was at the West Coast VHF Conference, I came across the Swiech Communication Systems COY6M3EL 6 meter beam. It is a rugged, easy-to-assemble (and disassemble, 7 minutes time, each), 3-element beam. It uses a balanced-type feed system. It is fed by a silver-plated N-type connector. Its light weight makes it ideal for rover operation.

The claimed gain is 6 dBd and the SWR bandwidth of 1.7 is 750 kHz, with a center frequency of 50.3 MHz. The power rating is 500 watts. The construction is stainless steel and the manufacturer claims a 10-year life span.

The price ($109.95) plus shipping (and CA sales tax, if applicable) is also easy—on the pocketbook, that is. For more information, contact Swiech at 12218 Greentree Rd., Poway, CA 92064 (phone/fax is 619-748-0708).

New Cuban Beacon

The following is from Oscar Morales, CO2OJ, via the Internet. "The Cuban VHF Group is testing a 6 meter beacon. The following are the specifics: 2 watts; dipole antenna; 60 meters (200 feet) over the sea level and 1.6 km (1 mile) from the north coast of Havana; signs CO2FRC; and the frequency is 50.082 MHz.

"We plan to improve it to 10 watts and install it in a 25-story building in a higher location before this summer end. I'll apreciate any report.—73, Oscar, CO2OJ"

Silent Key

Dave Hackford, N3CX, long-time VHFer and member of the Pack Rats, became a Silent Key in May. Dave operated beacons on 903, 1296, and 2304 MHz. His presence will be missed on these microwave bands.

And Finally . . .

Those of you who regularly read this column will find that what you are about to read will come as no surprise.

This fall I am planning on entering seminary to train for ordination in the United Methodist Church. It is a three to four year program that will lead to a probationary ordination approximately two years into it and full ordination approximately one to two years after completion of it.

I will still continue to write this column. I don't yet know where I will be in the fall because I have applied to a couple of schools (one here in Oklahoma and one in Texas). However, you will still be able to reach me via good old Box 73, as I will have that mail forwarded to me if I do leave the state. Additionally, I will maintain my phone numbers (although I may switch to a "500" area code later in the year). Furthermore, wherever I am, I can be reached by the Internet.

It is entirely possible that this career change will open up other doors of travel. If I go to Texas, I have tentatively accepted a part-time job with the "Methodist Reporter" newspaper. During school breaks I may travel to distant lands to cover activities of Methodists for stories in the newspaper. Naturally, I will also check out the local amateur radio population and the possibilities of getting on the air.

While we're on the subject of traveling to distant places for the church, I must tell you that as I am writing this column, I am only a week away from going to Bosnia for four weeks (I will be back just in time for the CSVHF Conference in Colorado Springs). While there, I will be working for the United Methodist Committee on Relief, helping refugees of the war. Naturally, I will be checking out the local amateur radio population, and hopefully will be reporting on that aspect of my trip in a future column. If you've tried to reach me this past month, you will know why it has been a bit difficult.

And speaking of reaching me, the numbers are: voice 405-528-6625; fax 405-528-0746; Internet 72124.2734@compuserve.com or JoeN6CL@aol.com. I will be looking forward to hearing from you in the near future.

Until next month . . .

73, Joe, N6CL

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CONTEST CALENDAR

BY JOHN DORR, K1AR

NEWS/VIEWS OF ON-THE-AIR COMPETITION

A Contester's Guide to Finding Multipliers

August's Contest Tip

Okay, so you've been hearing all this talk of second radios and you're gazing at your old, beat-up TS830 saying, "but this doesn't apply to me." Although not nearly as efficient as a second radio, the use of your second VFO on a single radio can be of some benefit. Try calling CQ on one VFO, and during periods of 5-10 second breaks tune with the other VFO. It may feel awkward at first, but it will allow you to call CQ more often and maybe put another five to ten QSOs in your log per hour at peak times.

Calendar of Events

July	22-23	SEANET '95 CW Contest
July	29-30	RSGB IOTA Contest
July	29-30	Venezuela CW DX Contest
Aug.	5-6	North American CW QSO Party
Aug.	5-6	YO DX Contest
Aug.	5-6	ARRL UHF Contest
Aug.	6	QRP ARCI Summer SSB Sprint
Aug.	12-13	Worked All Europe CW Contest
Aug.	12-13	Maryland-DC QSO Party
Aug.	12-13	Great New Mexico Chile Chase
Aug.	19-20	North American SSB QSO Party
Aug.	19-20	SEANET '95 SSB Contest
Aug.	19-21	New Jersey QSO Party
Aug.	26-27	West Virginia QSO Party
Sept.	2-3	All Asian SSB DX Contest
Sept.	2-3	Bulgarian DX Contest
Sept.	3	Panama XXIV Anniversary Contest
Sept.	9-10	Worked All Europe SSB Contest
Sept.	9-11	ARRL September VHF Contest
Oct.	14-15	Pennsylvania QSO Party
Oct.	**28-29**	**CQ WW DX SSB Contest**
Nov.	4-6	ARRL CW Sweepstakes
Nov.	18-20	ARRL SSB Sweepstakes
Nov.	**25-26**	**CQ WW DX CW Contest**

For most successful contest operators, maximizing your multiplier total is definitely a skill, albeit an acquired one. This month we're going to explore this topic and hopefully give you some pointers that can help optimize your contest scores this fall.

Let's begin with the basics. A multiplier is nothing more than a QSO that has a unique characteristic. It can be a new country, zone, prefix, grid square, or ARRL section, for example, that contributes more significantly to the final tally by virtue of how it is scored in the contest. Most contest rules specify that QSOs themselves have a certain point value. The total of those QSO points is then multiplied by the number of unique multipliers you have worked to compute the final score. As you can see, there can be tremendous value in working new multipliers in most contests.

Probably the first point to make about multiplier chasing is that you have to be knowledgeable about country prefixes and whether or not you have worked them. Fortunately, the latter has mostly been solved with the widespread use of contest logging programs. The former is a little more involved. You'd think that after 25 years of contest operating I would have a pretty good handle on country prefixes and callsigns. However, even the experienced contester can be fooled or be uninformed. Just the other night, while operating on 20 meter CW, I was having some fun running a string of UN stations (formerly UL7) during a particularly good band opening. After my luck ran out, I started tuning the band only to find a very loud RN1NM calling CQ. Naturally, I called him, expecting to place yet another Kazakh QSO in the log. To my surprise, he gave his QTH as Karelia, or just a UA1. The point is that you can't maximize your multiplier totals if you don't know who they are. With the world's prefixes changing almost daily in one place or another, this is an area on which all contesters have to constantly work. Frankly, I am rather clueless when it comes to knowing the Russian (or more accurately C.I.S.) prefixes anymore. Thank goodness for computer logging to help break the code in many cases!

Another example from years back, while on this topic, was a QSO I made with ZWØJR. As I tuned by the station, there was a huge pileup calling him. He was loud, the band had already gone out to Europe, and there was little else to work. I jumped into the fray, excited about the possibility of logging a PYØF! After four or five calls I finally worked him, only to find out that he was just a PY using a special prefix!

For many beginning contesters or those with smaller stations, contest operating is often composed of working everything you can hear. Believe it or not, that is not a bad strategy. However, there are some things you can do from any experience or station level that will help your score rise to new heights.

Probably the hardest decision to make for most operators is when to "CQ" vs. search and pounce. All too often this process is ultimately based on gut feeling and intuition. However, it doesn't take too much to know when a particular type of operating strategy isn't working. Five minutes of endless CQing with no answer may be acceptable on 2 meters near the end of a VHF contest, but it's probably not a good plan on a crowded 20 meter band. One of the advantages of today's contest logging software is that it generally reports the QSO value of a new multiplier. When looking at that information, ask yourself whether or not you think you can equal or exceed your current QSO rate if you tune up the band looking for multipliers and needed QSOs. The reverse applies as well. When calling in a tough pileup, how many QSOs are you losing? Is the point value of the multiplier you're trying to work in a pileup less than what you could make by CQing and running stations somewhere else? Questions, question, questions!

Regardless of your specific situation, you have to be aware of both your station's limitations and what else might be happening on your run frequency. An example of this is when the band first opens in the morning. Most times during this period DX stations will be working each other on what appears to you to be a completely clear frequency. Finally, some helpful DX station will work you only to inform you that there is a 59+30 UA3 covering you up in Europe that you can't even hear!

One of the basic points to consider when maximizing your multiplier totals is that searching and pouncing is your best way to find new ones. A slow and deliberate operating style works wonders here as you tune the band from one end to the other carefully listening to station after station. This tuning process is where the skill comes into play. An experienced contest operator develops a unique ability over time to recognize other stations that have been already worked while tuning the bands. In other words, tuning efficiency is key as you deploy the small mental notes you've made about a station's sending speed, use of "cut numbers," accent, or other identifying codes. The faster you can distinguish a station you've already worked, the faster you will find another new QSO that will actually make it into your log.

My experience with searching and pouncing is that many juicy multipliers can be found on somewhat obscure frequencies. For that reason I always tune the *entire* band when searching for multipliers. Some of the rarer stations tend to avoid the high-traffic parts of our bands for many reasons. They may not want the large pileups that can be generated there (although this approach is changing as packet radio becomes more predominant). Others may not be in the contest at all, but are willing to pass out a few points to a deserving few.

Another aspect of searching is to always be aware of the direction of your rotator. Many unusual multipliers can be found in directions other than that of the main band opening. For example, a good time to look for African or South American QSOs is when everyone else is beaming at Europe. We've all heard story after story of a 9X5 or VP8 station that couldn't get the attention of anyone in the contest for hours at a time because everyone was beaming somewhere else. This particular aspect of multiplier chasing can really take advantage of a stacked Yagi setup. Pointing one or more beams at Europe and the other(s) at Africa, for example, can pull some amazing stations out of the mud. It also can work for smaller stations. The basic idea here is to call 'em when others are not!

Strange or lesser known band openings can

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Say You Saw It In CQ

K1AR's Tips For Multiplier Chasing

- Be aware of the location of callsign prefixes—especially before the contest.
- Always consider the trade-offs between calling CQ and tuning.
- Make sure you tune the entire band when searching and pouncing.
- Keep your rotator constantly turning when tuning; that's what it's for!
- Learn about and check for obscure band openings—particularly ones that favor your geographic location.
- Prepare ahead of time by learning about pending contest operations and callsigns.
- Try the "multiplier passing" technique.

be your friend when searching for multipliers. I've mentioned this idea in other columns, but it still serves as a good reminder to mention it here again. Knowing about the more esoteric band openings that occur from your QTH can really give a multiplier advantage to your operation. From the East Coast, for example, there is almost always an opening to the south on 20 meters into Southeast Asia and JA during the middle of the night in the CQ WW SSB Contest. Careful tuning of the bands will yield multipliers such as BV, YB, 9M2, 9M6, HL, KH2, and so on. The best part is that they often do not have large pileups because many other East Coasters are busy listening to the noise on 80 or 160 meters. Only experience can help you with this operating tip, but trust me, the knowledge will come.

Being aware of what is coming up before the contest is another useful activity for increasing multiplier totals. With the proliferation of information on packet, Internet, newsletters, and other sources, there's really no excuse for not being cognizant of pending overseas contest operations. Part and parcel of this knowledge is attempting to be very active on the bands the weeks and days immediately before a contest is scheduled to begin. Not only does this provide an opportunity to understand propagation, it can also help you familiarize youself with the DX coming up in the contest and possible callsigns. Also, it doesn't hurt to get your callsign in the mind of the other station!

One angle on multiplier chasing that has been discussed at some length but that we haven't touched on here is band passing. Consider the following scenario. You're calling CQ on 14255 kHz and 5V7RE calls you. After working him, you have several possible alternatives. One might be to thank him for the call and to have a nice day. Another could be to get his QSL information. The right approach is to ask a very simple question (assuming you need him somewhere else): "I'd like you to QSY to 21255. . . . Can you go now?" Notice, I didn't ask questions such as (a) "Can we make a schedule?"; (b) "Can you QSY to 15 meters?"; or (c) "Do you work any other bands?" Rather, the direct approach is always more effective in finding out whether the station you are working is interested or willing to move to another needed band. And, you don't have to be a contest giant to try this. Even one successful band pass over an entire contest weekend will make your score grow beyond what it would have been without that successful attempt.

Now I know that this discussion has focused heavily on DX contest operating. However, if you think about it, most of the operating tips I've covered apply to domestic contests as well. Remember, multiplier chasing is mostly common sense. Despite the common folklore, there really aren't any big secrets in contest operating. There is, of course, the results that come from experience that can make you smarter and more efficient. But don't be intimidated by the "pros." You can be a productive contester as well with a little luck and a lot of contest smarts!

One of Many Days in the Life of A Bosnian Contester—T91ENS

While cruising through the usual overwhelming volume of e-mail recently, I pulled the following off the "net."It really made me think. Maybe it will have the same effect on you.

"Here is the T91ENS CQ WPX CW score—0 points! We cannot make a worse score than this! On Friday at 1130Z before the contest, the whole city loses electricity. There is little reason to worry, because similar things happen here quite often. By 1500Z, there is still no electricity. However we have obtained a promise from the power company that AC will be restored before the start of the contest. At 1815Z a 60 mm shell hits near our QTH, severing the telephone line and now making it impossible to contact the power company. Now our only method of communication is via our 2 meter handheld."

As you can surmise, T91ENS never did get power to operate that weekend. As Tom,

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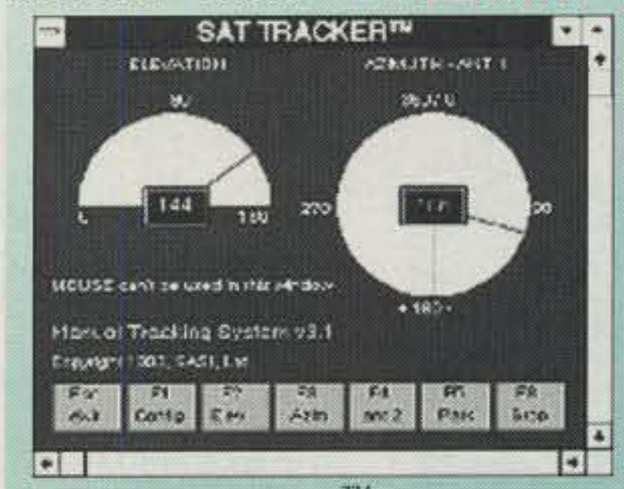

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WB4IUX, put it in response to this story, "We should remember situations like this when we feel like complaining that things in ham radio just aren't the way we want them. Perhaps 99.99% of us don't have to worry about incoming 60 mm shells interfering with our ham radio fun." I agree with Tom that nothing like a little *perspective* to wake you up in the morning!

Final Comments

As has become the tradition of this column, next month will feature our annual *CQ* Contest Survey. This is always a fun project, because it provides for a rare opportunity to learn your opinions about some of contesting's hottest topics. Be sure to watch for it and get your responses to *CQ* early.

That's it for this month. As always, please remember that the deadline for the November issue is September 1st.

73, John, K1AR

ARRL UHF Contest

1800Z Sat. to 1800Z Sun., Aug. 5–6

Activity on this one starts at 220 MHz and goes all the way up to 2.3 GHz and higher.

Exchange: Grid square locator.

Points: Take three points for 220 or 432 MHz contacts, six for 902 or 1296 MHz. Credit 12 points for 2.3 GHz or higher.

Multiplier: Total number of different grid squares worked on each band. Final score is the total QSO points from all bands times the sum of the grid-square multiplier from each band.

An award pin program is available for this contest for making 5 QSOs. Details including the full rules were published in the July issue of *QST*. It is suggested you send a large SASE to the ARRL for official log and summary sheets.

Send logs to ARRL UHF Contest, 225 Main Street, Newington, CT 06111.

YO DX Contest

2000Z Sat. to 1600Z Sun., Aug. 5–6

This is the annual running of the YO DX Contest sponsored by the Romanian Amateur Radio Federation. It is a worldwide contest with everyone working each other on SSB and CW.

Classes: Single operator all bands/single band and multi-operator/single transmitter.

Frequencies: CW: 3510–60, 7010–40, 14010–60, 21010–60, 28010–60 kHz. SSB: 3700–75, 7040–90, 14150–250, 21200–300, 28400–600 kHz.

Exchange: RS(T) plus ITU Zone. YO stations will substitute their two-letter country abbreviation for their zone.

Scoring: 8 points for YO QSOs, 4 points for QSOs outside your continent, and 2 points for QSOs within your continent. Final score is computed by multiplying your total QSO points times the sum of YO counties and ITU Zones worked on each band.

Deadline for logs is September 6, 1994 and should be mailed to: RARF, P.O. Box 05-50, R-76100 Bucharest, Romania.

North American QSO Party

CW: 1800Z Sat., Aug. 5 to 0600Z Sun., Aug. 6
SSB: 1800Z Sat. Aug. 19 to 0600Z Sun. Aug.20

This is a short but fun QSO party that can have some fast rates at times. Any licensed radio amateur may enter with the object being to work as many North American stations (and/or other stations if you are in North America) as possible during the contest period.

Classes: Single operator and multi-operator, two transmitter. Multi-operator stations shall keep a separate log for each transmitter. Multi-operator stations must have at least 10 minutes between band changes. Single operator entrants may only have one transmitted signal at a time. Output power must be limited to 150 watts for eligible entries. Single operator stations may operate 10 out of 12 hours. Off times must be at least 30 minutes in length and must be clearly marked in the log.

Mode: CW only in CW parties. Phone only in Phone parties.

Bands: 160, 80, 40, 20, 15, and 10 meters only. You may work a station once per band. Suggested frequencies are 1815, 3535, 7035, 14035, 21035, and 28035 (20 kHz up from band edge for Novices) on CW, and 1865, 3850, 7225, 14250, 21300, and 28600 (28450 for Novices) on phone. Try 10 meters at 1900Z and 2000Z, 15 meters 1930Z and 2030Z, and 160 meters at 0430Z and 0530Z.

Exchange: Operator name and station location (state, province, or country).

Scoring: Multiply total valid contacts by the sum of the number of multipliers worked on each band. Multipliers are states (including KH6 and KL7), Canadian call areas (VE1–VE8, VO1, VO2, VY1, and VY2), and other North American countries (do not count USA, Canada, KH6, or KL7 as countries). Non-North American countries do not count as multipliers, but may be worked for QSO credit.

Team Competition: Team competition is limited to a maximum of five single operator stations as a single entry unit. Groups having more than five members may submit more than one team entry. To qualify as a team entry, the name, callsign of each operator, and callsign of the station operated should the operator be a guest at a station other than his own (e.g., W6EEN op by KA6SAR) must be registered with W9NQ. The team registration information must be in written or telegraphic form and must be received before the start of the NAQP. There are neither distance nor meeting requirements for a team entry.

Awards: A total of five plaques will be awarded for the high score for the single operator CW, single operator phone, multi-operator CW, multi-operator phone, and single operator combined score categories. Certificates of merit will be awarded to the highest scoring entrant with at least 200 QSOs from each state, province, and North American country.

Contest logs must be sent to Bob Selbrede, W9NQ, 6200 Natoma Ave., Mojave, CA 93013.

Entries must be postmarked not later than 30 days after the party to be eligible for trophies and awards. Logs may be submitted by K8CC's NA program or MS-DOS ASCII files if generated from another logging program.

European DX Contest

CW: Aug. 12–13 SSB: Sept. 9–10
0000Z Saturday to 2400Z Sunday

This is the 41st annual contest sponsored by the DARC. The activity will be between European countries and the rest of the world on all five bands, 3.5–28 MHz (IARU Region I reg-

ulation of frequencies for contest operation).

A reminder: The WAEDC has returned to a 48-hour format for all operating classes. In addition, there is no longer a multi-multi category. Finally, take note that UA1N has been deleted from the WAE country list.

Classes: (a) Single operator, all band. (b) Multi-operator, single transmitter; only one signal on any band at the same time. (c) SWL. Note: DX packet cluster spotting is allowed for all classes.

Exchange: RS(T) plus a progressive QSO number starting with 001.

Points: One point per QSO and 1 point for each QTC reported.

Multiplier: The multiplier for non-Europeans is determined by the number of European countries worked in each band (see the WAE country list). Europeans will use the ARRL DXCC list of non-European countries.

Bonus Multiplier: Multiply your multiplier on 80 meters by 4, on 40 by 3, and on 10/15/20 by 2.

Final Score: Total QSO points plus QTC points times the sum total multiplier from all bands.

SWL: Only the single operator, all-band class may be used. The same callsign, European or non-European, may be logged only once per band. The log must contain both callsigns and at least one of the control numbers. Each QSO logged counts 1 point; each complete QTC 1 point (maximum of 10 per station). Multiplier is determined by the DXCC and WAE country lists.

QTC Traffic: Additional point credit may be earned by making use of the QTC traffic feature. A QTC is a report of a confirmed QSO that took place earlier in the contest and was later sent back to a European station. It can only be sent by a non-European station back to a European. The general idea is that after a number of Europeans have been worked, a list of these stations can be reported back during a QSO with another station. An additional one-point credit can be claimed for each station reported.

A QTC contains the time, call, and QSO number of the station being reported (e.g., 1300/DL2DN/134, which means that at 1300Z you worked DL2DN and received #134).

A QSO can be reported only once and not back to the originating station. A maximum of 10 QTCs to a station is allowed. The same station may be worked several times to complete this quota. Only the original contact, however, has QSO value.

Keep a uniform list of QTCs sent; 3/7 indicates that this is the third series of QTCs sent and that 7 are being reported.

If more than 100 QTCs are claimed, a check list must show that the maximum quota of 10 per station is not exceeded.

Club Competition: This rule requires the club to be a local group and not a national organization. Eligible club members must operate within a 500 km diameter. To be listed, a minimum of three logs must be received from a club. Entries must clearly indicate their club name on the summary sheet. A special trophy will be awarded by the DARC to the winning clubs from Europe and non-Europe.

Awards: Certificates will be awarded to the top scorers in each class in each country. Each participant with at least half the score of the continental leader will also receive a certificate. Plaques will go to continental winners in the single- and multi-operator classes and the winning EU and non-EU clubs.

Logs: It is suggested that you use the official DARC or equivalent log form. Logs may also be sent on MS-DOS disks ASCII files. Use 40 contacts to the page and a separate sheet for each band. Submit a dupe sheet for each band with 200 or more contacts. A summary sheet showing the score and a signed declaration are also required (sample log forms are available with an SASE and/or IRCs).

WAE Country List: C31, CT1, CU, EA, EA6, EI, F, G, GD, GI, GJ, GM, GM Shetland, GU, GW, HA, HB, HB0, HV, I, IS,IT, JW Bear, JW Spitsbergen, JX, LA, LX, LZ, OE, OH, OHØ, OJ0, OK, OM, ON, OY, OZ, PA, S5, SM, SP, SV, SV5 Rhodes, SV9 Crete, SY Athos, T7, T9, TA1, TF, TK, UA1346, other EU-CIS republics, YU1267, ZA, ZB2, 1AØ, 3A, 4J1M-V, 4N5, 4U1 Vienna, 9A, and 9H1.

Mailing deadline is September 15th for CW entries and October 15th for SSB to: WAEDC Contest Committee, P.O. Box 1126, D-74370 Sersheim, Germany.

Maryland DC QSO Party

1600Z Sat. to 0400Z Sun. Aug. 12–13
1600Z to 2359Z Sun. Aug. 13

The Maryland/DC QSO Party is sponsored by the Antietam Radio Association. Non-Maryland stations work Maryland/DC operators. Maryland/DC station may work anyone. Stations may be worked once per band/mode and mobiles/portables that change counties may be worked again for QSO credit.

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Exchange: QTH (county for MD stations, state/province/DXCC country for others) and operating category (Club, QRP, Mobile, Novice, Technician, and Standard).

Frequencies: SSB 3920, 7230, 14260, 21370, 28380, 50150, and 146550 kHz. CW 3643, 3701, 7035, 7126, 14040, 21115, and 28040 and 28115 kHz.

Scoring: Each Maryland county, Baltimore city, and D.C. are multipliers. Score 10 points for club station QSOs, 5 points for mobiles, 4 points fro QRP/Novice and Technician QSOS, 3 points for a CW contact, and 1 point for any other valid contact. QSO points are cumulative (e.g., mobile MD stations count 5 points). Final score is total QSO points times multiplier (25 maximum).

Awards: Plaques are available to the high scoring MD-DC, non-MD-DC, and MD-DC club. Certificates will be awarded to the high scorer from each state and Canadian province. In addition, there will be awards to the high score from a MD mobile, top 10 MD logs, Novice, Technician, DX station, and MD YL.

Logs are to be postmarked by September 10th and sent to: Antietam Radio Association, P.O. Box 52, Hagerstown, MD 21741. Be sure to indicate your operating class on the summary sheet. If you want the final results, include an SASE with your entry.

SARTG RTTY Contest

Three Periods GMT
0000–0800 & 1600–2400 Sat., Aug. 19
0800–1600 Sun., Aug. 20

This is the 25th annual contest sponsored by the Scandinavian Amateur Radio Teleprinter Group. Use all bands 3.5 through 28 MHz. The same station may be worked on each band for QSO and multiplier credit.

Classes: Single operator all band, single operator single band, multi-operator single transmitter, and SWL.

Exchange: RST and QSO number.

Points: QSOs with own country, 5 points. With other countries on same continent, 10 points. With other continents, 15 points.

Multiplier: Each DXCC country and each W/K, VE/VO, and VK call area.

Final Score: Sum of QSO points from all bands times the sum of the multiplier from each band. SWLs use same scoring but based on sum of stations and messages copied.

Awards: Certificates to the top-scoring stations in each class in each country and each call area of the U.S., Canada, and Australia.

Use a separate sheet for each band, and include a summary sheet showing the scoring, comments, and other essential information, and your name and address in block letters.

Logs must be received by October 10th and go to: SARTG Contest Manager, Bo Ohlsson, SM4CMG, Skulsta 1258, S-710 41 Fellingsbro, Sweden.

New Jersey QSO Party

2000Z Sat. to 0700Z Sun., Aug. 19–20
1300Z Sun. to 0200Z Mon., Aug. 20–21

This is the 35th annual party sponsored by the Englewood ARA. Phone and CW are part of the same contest. The same station may be worked on each band and mode, and NJ stations may contact in-state stations for QSO and multiplier credit.

Exchange: QSO number, RS(T), and QTH. County for NJ, state/province or country for others.

Scoring: All stations credit 3 points for each contact. Multiply total QSO points by multiplier to compute final score. Out-of-state stations multiply total NJ QSOs by number of NJ counties worked (maximum of 21).

Frequencies: 1810, 3535, 3950, 7035, 7135, 7235, 14035, 14285, 21100, 21355, 28100, 28400 kHz and 50–50.5, and 144–146 MHz. Suggest phone on even hours, 15/10 meters on odd hours, and 160 at 0500Z.

Awards: Certificates to the top scorers in each NJ county, ARRL, section, and DX country. Second-place awards if four or more logs are received from that section. Also Novice/Tech and mobile awards. There are four plaques donated by the section managers for NNJ and SNJ to the winning stations in those sections.

Use UTC time and indicate the multiplier only the first time it is worked. Be sure to include a QSO check sheet, and a summary sheet showing scoring, etc. Send a large SASE if you wish a copy of the results.

Stations planning activity in NJ are requested to advise the EARA by August 1st so that coverage in all counties may be planned.

Logs must be received no later than Sept. 18th and go to: Englewood ARA, P.O. Box 528, Englewood, NJ 07631-0528.

All Asian SSB Contest

0000Z Sat. to 2400Z Sun., Sept. 2–3

The same rules for the CW Contest on June 17–18 apply here. See the June Contest Calendar for complete rules. Logs for this one must be received by the committee no later than October 15th. They go to: JARL, P.O. Box 377, Tokyo Central, Japan.

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External Temperature/Humidity Sensor **7859-R** $99.95
Davis Anemometer Mast Mount **7890-R** $15.95
Weatherlink Software for IBM PC-Version 3.0 **7862-R** $139.95
Weatherlink Software for Apple-Version 3.0 **7866-R** $139.95
4-Conductor 40' (12.2 m) extension cable **7876-R** $17.95
6-Conductor 40' (12.2 m) extension cable **7878-R** $21.95
8-Conductor 25' (7.6 m) junction box cable **7880-R** $14.95
8-Conductor 50' (15.2 m) junction box cable **7881-R** $24.95
8-Conductor 100' (30.5 m) junction box cable **7882-R** $44.95
Modem Adaptor 25-Rin for communications port **7870-R** $9.95
Car/Boat/RV Lighter Power Cord **7873-R** $9.95
2400 baud modem for Weatherlink **MEXT-R** $39.95
Talking weather card - Call 313-994-9000 for demo **IT1-R** $474.95
Weatherlink language disks: Française, Deutsche, Italiana, Española **7863-R** $24.95
Barometer, Indoor Hygrometer & Thermometer, Clock/Calendar **BA888-R** . $99.95
Indoor-Outdoor Thermometer/Barometer & Hygrometer by OSI **BA213-R** .. $79.95
Thermometer with transparent calender & clock display by OSI **TC188-R** .. $19.95
Thermometer with AM/FM clock radio by Oregon Scientific **CR388-R** $39.95
Indoor/Outdoor Thermometer with Jumbo Display by OSI **JB880EX-R** $24.95

Bearcat® 9000XLT-R Radio Scanner

Mfg. suggested list price $769.95/**CE Special $374.95**
500 Channels · 20 banks · Alpha numeric display
Turbo Scan · VFO Control · 10 Priority channels
Auto Store · Auto Recording · Reception counter
Frequency step resolution 5, 12.5 & 25 KHz.
Size: 10-1/2" Wide x 7-1/2" Deep x 3-3/8" High

Frequency Coverage:
25.000-549.995 MHz., 760.000-823.995 MHz., 849.0125-868.995 MHz., 894.0125-1,300.000 MHz.

The Bearcat 9000XLT gives you pure scanning satisfaction with amazing features like TurboSearch™ to search VHF channels at 300 steps per second. This base and moble scanner is ideal for surveillance professionals because it has a selectable attenuator to help eliminate annoying intermodulation from adjacent frequencies in highly populated areas and selectable AM, Wide FM and Narrow FM modes that allow you to change the default receiving mode of the BC9000XLT. Other features include ***Auto Store*** - Automatically stores all active frequencies within the specified bank(s). ***Auto Recording*** - This feature lets you record channel activity from the scanner onto a tape recorder. **Hi-Cut filter** to help eliminate unwanted static noise. You can even get an optional ***CTCSS Tone Board*** (**C**ontinuous **T**one **C**ontrol **S**quelch **S**ystem) which allows the squelch to be broken during scanning only when a correct CTCSS tone is received. For maximum scanning enjoyment, order the following optional accessories: **PS001** Cigarette lighter power cord for temporary operation from your vehicle's cigarette lighter $14.95; **PS002** DC power cord - enables permanent operation from your vehicle's fuse box $14.95; **MB001** Mobile mounting bracket $14.95; **BC005** CTCSS Tone Board $54.95; **EX711** External speaker with mounting bracket & 10 feet of cable with plug attached $19.95. The BC9000XLT comes with AC adapter, telescopic antenna, owner's manual and one year limited warranty from Uniden.

CB/GMRS Radios

The Maxon GMRS 210+3 transceiver is a PLL synthesized 10 channel radio on General Mobile Radio Service frequencies. It's the ideal radio for storm chasing activities. Two repeater channels are programmable and one channel (462.675 MHz.) is set aside for emergency and safety communications. The seven remaining interstitial frequencies 462.5625, 462.5875, 462.6125, 462.6375, 462.6625, 462.6875 & 462.7125 MHz are all-purpose GMRS radio channels. 2 watts of RF power for exceptional transmitting range. Up to 5 watts when used with the supplied 12 volt vehicular DC power cord. CTCSS built-in. Includes 450mAh Ni-cad rechargeable battery pack, AC/DC wall battery charger, owner's manual, FCC license application, belt clip, antenna. Call 1-800-USA-SCAN to order.

Maxon GMRS210+3-R GMRS transceiver $199.95
WTA6GA-R Alkaline battery case - requires 6 AA batteries $19.95
WTA6GN2-R 600 mAh rechargeable ni-cad battery for 210+3 $39.95
WTA8GA-R Carrying case for Maxon GMRS210+3 ..... $29.95
WTA10G-R Speaker/microphone for Maxon GMRS210+3 ..... $39.95
WTA13G-R Push-to-talk mini-VOX headset for GMRS210+3 ... $79.95
WTA14-R Antenna adaptor/screw-in male to BNC connector . $14.95
ANT4GM-R 1/4 wave UHF magnetic mount mobile antenna .. $29.95
Cobra 2010GTLWX-R SSB base w/weather alert $379.95
Cobra 148FGTL-R CB with frequency counter ... $209.95
Cobra 29LTDWX-R CB/weather alert $114.95
Cobra HH40-R CB 40 ch. Handheld $99.95
Ranger RCI2950-R 25 watt 10 meter $239.95
Uniden GMR100-R GMRS Handheld $144.95
Uniden WASHINGTON-R SSB CB Base $199.95
Uniden GRANTXL-R SSB CB Mobile $139.95
Uniden PRO538W-R CB & Weather $59.95

VHF Transceiver

RELM® WHS150-R Transceiver/SPECIAL

Mfg. suggested list price $481.67/**CE price $299.95**

Police and fire departments depend on the RELM WHS150 transceiver for direct two-way communications with their police, fire department, civil defense agency or ham radio repeater. The WHS150 is our most popular programmable five watt, 16 channel handheld transceiver that has built-in CTCSS, which may be programmed for any 39 standard EIA tones. Frequency range 148.000 to 174.000 MHz. Will also work 144.000-148.000 with slightly reduced performance. The full function, DTMF compatible keypad also allows for DTMF Encode/Decode and programmable ANI. Weighing only 15.5 oz., it features dealer programmable synthesized frequencies either simplex or half duplex in both 5.0 and 6.25 KHz. increments. Other features include scan list, priority channel, selectable scan delay, selectable 5 watt/1 watt power levels, liquid crystal display, time-out timer and much more. When you order the WHS150 from Communications Electronics Inc., you'll get a complete package deal including antenna, battery, belt clip and user operating instructions. Other accessories are available. A leather carrying case with swivel belt loop part #LCWHS is $49.95; rapid charge battery charger, part #BCWHS is $69.95; speaker/microphone, part #SMWHS is $54.95; extra ni-cad battery pack, part #BP007 is $59.95. The radio technician maintaining your radio system must order programming instructions part #PI150 for $18.00 to activate this radio. FCC license required for United States operation.

Other neat stuff

WX70-R weather radio with National Weather Service storm alert $39.95
WB-R USA Today The Weather Book, Guide to USA weather by Jack Williams $15.95
PSUN-R Partly Sunny, Weather Junkie's Guide to Weather by Alan Fields $11.95
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Grundig Satellit 700-R digital portable shortwave with 512 memory $459.95
Grundig Yacht Boy 400-R digital portable shortwave - 40 memory $179.95
Grundig Yacht Boy 230-R portable shortwave receiver $109.95
Sangean ATS800-R portable 20 memory shortwave receiver $69.95
Sangean ATS803A-R portable shortwave w/AC adapter – 9 memory $129.95
Sangean ATS808-R portable 45 memory shortwave receiver $149.95
Uniden EXP9200-R 900 MHz. 1 or 2 line spread spectrum cordless phone . $289.95
Uniden EXP9100-R 900 MHz. 1 line cordless spread spectrum telephone ... $229.95
Bogen FR3110-R Digital FAX Friday Fax-on-Demand & answering system ... $399.95
Bogen FR3020-R memory module for Fax Friday/up to 36 minutes $99.95
Bogen FR2000-R Digital two-line voice mail & answering machine $279.95
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ICOM GP22-R handheld global positioning system (GPS) $494.95
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Ranger RCI2950-R 25 watt 10 meter ham radio transceiver $239.95
Cobra RDL712SW-R Safety Alert & Super Wideband Laser/Radar receiver .. $159.95
Uniden LRD9900SW-R Super Wideband Laser/Radar receiver $139.95
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BILL'S BASICS

BY BILL WELSH, W6DDE

"HOW TO" FOR THE NEWCOMER TO AMATEUR RADIO

International Agreements Applicable To Amateurs

Our government has two sets of international agreements which are particularly important in regard to operation by United States amateur radio operators. The current reciprocal operating and third-party traffic agreement lists are dated 26 October 1993 and 25 October 1993, respectively, by the Federal Communications Commission (FCC). We have reciprocal operating agreements with 119 "countries." We have third-party traffic agreements with 45 "countries." Both of these agreements are in effect with 38 "countries." In some cases, an agreement with one country (such as France or England) constitutes an agreement with many other places that have DXCC credit.

One set of agreements (reciprocal operating) permits USA amateurs to operate in foreign countries, and it permits amateurs of those countries to operate in this country. This is called *reciprocal operating*. In neither case are amateurs required to pass tests to operate in the other country; all nations' licenses are accepted as proof of operating qualification. This reciprocal operating system is greatly appreciated by active amateurs who visit other countries.

The other set of agreements (third-party traffic) concerns the exchange of noncommercial (personal) traffic (via amateur radio) between people in different countries, which is greatly appreciated as a person-to-person service. Table I shows the countries with which we have reciprocal operating (R) and/or third-party traffic (T) agreements.

Reciprocal Operating and Licensing

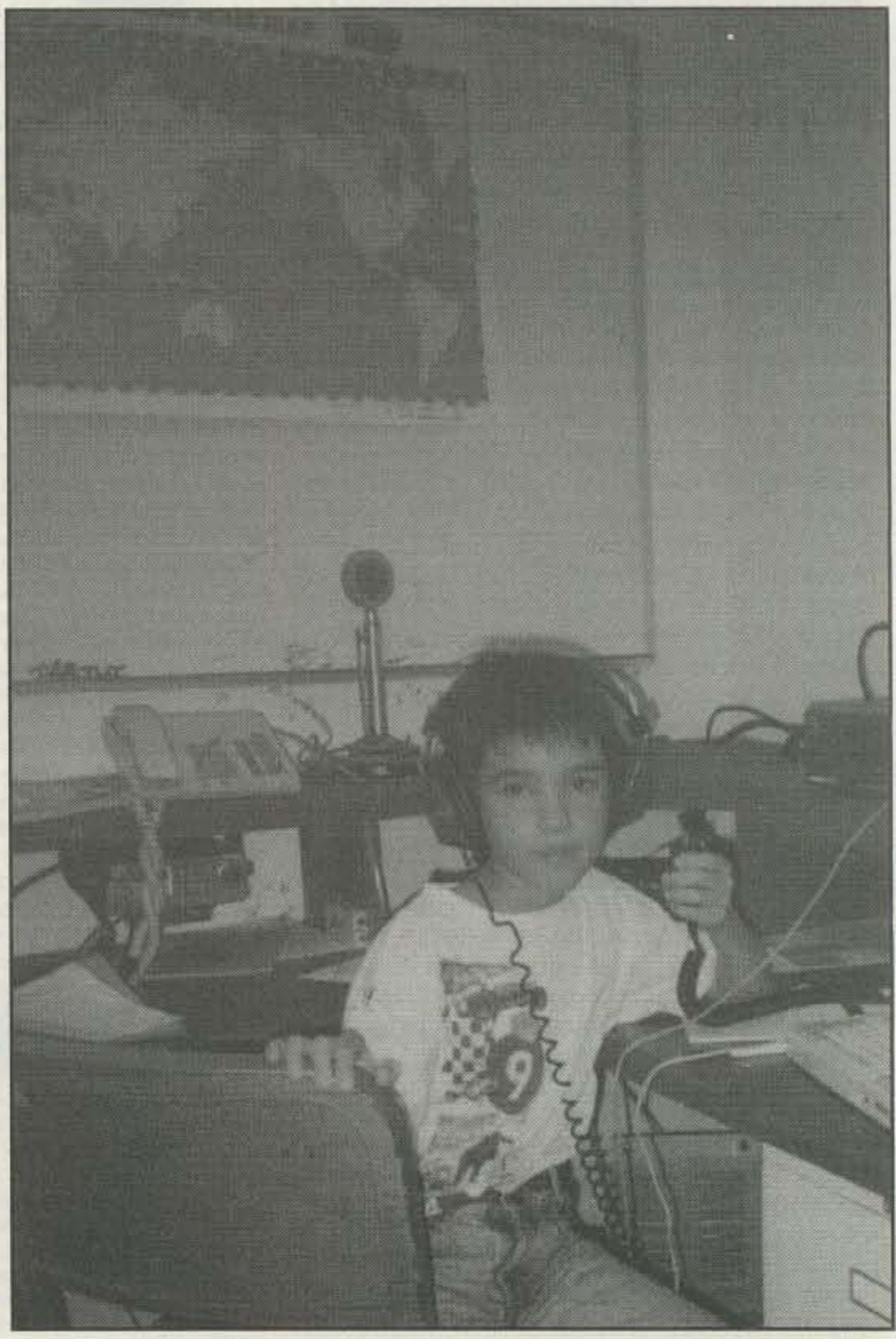
The FCC only issues reciprocal operating permits to visiting alien amateur radio operators who are licensed by (and are citizens of) the indicated countries. Alien amateurs must apply for a permit to operate from any area where amateur radio is controlled by the FCC. USA citizens are not eligible to receive an FCC-issued reciprocal operating permit. If an alien amateur holds an FCC-issued reciprocal operating permit, it is superseded by whatever FCC-issued USA amateur radio license she/he obtains. In this case, the alien's operating privileges are no longer related to her/his home country's privileges; they are the privileges of the class of FCC-issued amateur license she/he earned. Foreign amateurs are encouraged to obtain USA licenses, if they are going to be in this country a long time. Except for representatives of foreign governments, anyone may apply for a USA amateur radio license. Such applicants simply have to pass the same examination elements that are administered to Americans.

Alien amateurs may apply for a permit by completing an FCC form 610-A, attaching a copy of her/his (foreign) valid amateur license, and mailing these items to the Federal Communications Commission, Consumer Assistance Branch, 1270 Fairfield Road, Gettysburg, Pennsylvania 17325-7425 USA. The telephone number of the Personal Radio Branch in room 5322 is 202-632-4964. Some USA missions (in foreign countries) have the FCC form 610-A, and it can be obtained by writing to the FCC, 1919 M Street NW, Washington, DC 20554 USA. The form 610-A one uses must be dated August 1986 or later. Earlier versions will not be accepted; they will be returned without action. An FCC-issued permit is valid for one year, until the alien's home country amateur license expires, or until the alien obtains a USA amateur license, depending on which occurs first.

Operating privileges of a permit holder are detailed in the FCC Rules and Regulations. Part 97 governs the USA Amateur Radio Service. Basically, the permit holder is limited to the operating privileges that apply to her/his class of license in her/his home country. However, FCC regulations must be obeyed and USA Extra class operating privileges may not be exceeded by reciprocal licensees, regardless of the privileges existing in their home countries. As an example of this, reciprocal licensees are not allowed to transmit (on voice) in the 14,100 to 14,150 kHz portion of the 20 meter DX voice segment. Reciprocal permit holders have only the privileges of their own licenses, but not to exceed U.S.A. Extra Class operating privileges. Violations should be reported to the FCC. The exact callsign shown on the permit must be used by the reciprocal licensee when identifying her/his station. The appropriate USA letter-numeral prefix precedes the reciprocal licensee's home callsign. As an example, if CP5WDX is operating in California, his identification is W6/CP5WDX (code) or W6-stroke (or slash)-CP5WDX (voice). The entire callsign must be used when identifying a station. In this example, do not shorten it to W6/CP5WD. The reciprocal licensee is required to indicate (in English) the approximate geographic location (city and state, etc.) from which she/he is operating. This information is required at least one time during each contact. Canadian amateurs still identify the original way with the American indicator following their callsign, such as VE7SR/W6.

USA amateurs who want to obtain reciprocal operating permits from

45527 Third Street East, Lancaster, CA 93535-1802



Eight-year-old Bobby Miller, KE4MTG, of Coconut Grove, Florida, passed Novice and Technician examinations during March 1994. His proud Dad is Bob Miller, WA4QKO. Their station includes an ICOM 735 transceiver with a Cushcraft R5 vertical. Bobby has several of his second-grade classmates interested in becoming amateurs.

Say You Saw It In CQ

COUNTRY	R	T	COUNTRY	R	T
Antigua & Barbuda	*	*	Martinique (see France)	*	
Argentina	*	*	Mexico	*	*
Ascension Island (see United Kingdom)	*		Monaco	*	
Australia	*	*	Montserrat (see United Kingdom)	*	
Austria	*		Netherlands	*	
The Bahamas	*		Netherlands Antilles	*	
Bailiwick of Guernsey (see United Kingdom)	*		New Caledonia (see France)	*	
Barbados	*		New Zealand	*	
Belgium	*		Nicaragua	*	*
Belize	*	*	Northern Ireland (see United Kingdom)	*	
Bermuda (see United Kingdom)	*		Norway	*	
Bolivia	*	*	Panama	*	*
Bonaire (see Netherlands Antilles)	*		Papua New Guinea	*	
Bosnia-Herzegovina		*	Paraguay	*	*
Botswana	*		Peru	*	*
Brazil	*	*	Philippines	*	*
British Virgin Islands (see United Kingdom)	*		Portugal	*	
Canada	(1)	*	Republic of Ireland	*	
Cayman Islands (see United Kingdom)	*		Republic of South Africa	*	
Channel Islands (see United Kingdom)	*		Republic of the Marshall Islands (see United Kingdom)	*	
Chile	*	*	Reunion Island (see France)	*	
Colombia	*	*	Saba (see Netherlands Antilles)	*	
Costa Rica	*	*	Saint Kitts & Nevis Islands		*
Cuba		*	Saint Helena (see United Kingdom)	*	
Curaçao (see Netherlands Antilles)	*		Saint Lucia	*	*
Cyprus	*		Saint Pierre & Miquelon Islands (see France)	*	
Denmark	(2)		Saint Vincent & The Grenadines	*	*
Dominica	*	*	Seychelles	*	
Dominican Republic	*	*	Sierra Leone	*	*
Ecuador	*	*	Sint Eustatius (see Netherlands Antilles)	*	
El Salvador	*	*	Sint Maarten (see Netherlands Antilles)	*	
England (see United Kingdom)	*		Society Islands (see France)	*	
Falkland Islands (see United Kingdom)	*		Solomon Islands	*	
Federal Islamic Republic of Comoros		*	South Georgia Islands (see United Kingdom)	*	
Federal Republic of Germany	*		South Sandwich Islands (see United Kingdom)	*	
Federated States of Micronesia	*	*	Spain	*	
Fiji	*		Surinam	*	
Finland	*		Swaziland		*
France	(3)		Sweden	*	
French Guiana (see France)	*		Switzerland	*	(4)
French Polynesia (see France)	*		Thailand	*	
The Gambia		*	Trinidad & Tobago	*	*
Gambier Island (see France)	*		Tristan da Cunha Island (see United Kingdom)	*	
Ghana		*	Tuamoto Archipelago (see France)	*	
Gibraltar (see United Kingdom)	*		Tubuai Island (see France)	*	
Gough Island (see United Kingdom)	*		Turks & Caicos Islands (see United Kingdom)	*	
Great Britain (see United Kingdom)	*		Tuvalu	*	
Greece	*		United Kingdom	(5)	(6)
Greenland (see Denmark)	*		Uruguay	*	*
Grenada	*	*	Venezuela	*	*
Guadeloupe (see France)	*		Wallis and Futuna Islands (see France)	*	
Guatemala	*	*	Yugoslavia	*	
Guernsey (see United Kingdom)	*				
Guyana	*	*			
Haiti	*	*			
Honduras	*	*			
Hong Kong (see United Kingdom)	*				
Iceland	*				
Ile Amsterdam (see France)	*				
Ile Saint-Paul (see France)	*				
Iles Crozet (see France)	*				
Iles Kerguelan (see France)	*				
India	*				
Indonesia	*				
Isle of Man (see United Kingdom)	*				
Israel	*	*			
Italy	*				
Jamaica	*	*			
Japan	*				
Jersey (see United Kingdom)	*				
Jordan	*	*			
Kiribati	*				
Kuwait	*				
Liberia	*	*			
Luxembourg	*				
Marquesas (see France)	*				

Notes

1. No reciprocal operating permits are required between Canada and the United States.

2. Also applies to Greenland.

3. Also applies to French Guiana, French Polynesia (Gambier, Marquesas, Society, and Tubuai Islands, plus Tuamotu Archipelago), Guadeloupe, Ile Amsterdam, Ile Saint-Paul, Iles Crozet, Iles Kerguelan, Martinique, New Caledonia, Reunion, Saint Pierre and Miquelon, plus Wallis and Futuna Islands.

4. USA/ITU agreement authorizes third-party traffic to be exchanged between the USA and 4U1ITU (Geneva, Switzerland) and 4U1VIC (Vienna, Austria).

5. Reciprocal licensing also applies to Bermuda, British Virgin Islands, Cayman Islands, Channel Islands (including Guernsey and Jersey), Falkland Islands (including South Georgia Islands and South Sandwich Islands), Great Britain, Gibraltar, Hong Kong, Isle of Man, Montserrat, Northern Ireland, Republic of the Marshall Islands, Saint Helena (including Ascension Island, Gough Island, and Tristan da Cunha Island), plus Turks and Caicos Islands.

6. Third-party traffic may be exchanged with United Kingdom special events stations (GB prefixes), except stations with the GB3 prefix.

Table I– List of countries with which the U.S.A. has reciprocal operating (R) and/or third-party traffic (T) agreements.

Aleksandar (Aco) Radosav, T92X, of Kakanj in Bosnia-Herzegovina is the T9 high-frequency manager. His location is about 27 miles west of Sarajevo. He has been an amateur since 1980.

the countries with which we have such agreements should request the appropriate forms from officials of those countries. USA-based foreign embassies and legations may have the required forms; if not, they should be able to provide information about where such forms can be obtained. Forms may also be obtained by requesting them from the amateur radio licensing authority of the country you intend to visit. The ARRL has a reciprocal licensing expert who provides names, callsigns, addresses, telephone numbers, and related data in response to requests for reciprocal licensing information received from American amateurs. The ARRL's address is 225 Main St., Newington, CT 06111.

When USA amateurs operate (as reciprocal licensees) in other countries, they must abide by the regulations which apply to those countries. ITU Region II (North, Central, and South Americas) regulations do not go with you when operating in ITU Region I (Europe and Africa) or ITU Region III (Australasia and the rest of the Southern Hemisphere). All licensees must abide by the radio regulations of the International Telecommunications Union (ITU).

Third-Party Traffic

Third-party traffic involves at least one person in addition to the operators who are handling the traffic. Third-party traffic includes message traffic handled directly between amateurs, plus telephone (phone) patch traffic, in which people (not just amateurs) speak to each other directly (normally using the telephone in their homes) via amateur radio. Any recognized language may be used when handling international third-party traffic, but station identification must be in English. AMTOR, ASCII, RTTY, and other modes may also be used. Third-party traffic must be of a personal nature. Business messages are prohibited, except during emergencies. FCC-licensed amateurs are not allowed to exchange third-party traffic with amateurs in countries with which this country does not have a third-party traffic agreement. Amateurs are not allowed to accept money, services, or goods in exchange for handling third-party traffic.

Only personal messages may be handled by amateur radio operators under normal circumstances. These messages must be such that they would not normally be sent by any existing means of electrical communications, or would not be sent by any means except for an amateur station being available. These messages must be in plain language.

The callsigns of both (foreign and American) stations must be transmitted to identify stations handling third-party traffic. Your own callsign (alone) does not suffice in this case. If you have a question about the status of a country (in regard to these lists), you could call the ARRL or the Personal Radio Branch of the FCC at 202-632-4964 to obtain the latest information. USA amateurs are allowed to communicate directly with all other amateurs throughout the world; there is presently no country which has issued notice that it objects to USA amateurs contacting their amateurs. Such contacts do not constitute the exchange of third-party traffic.

Expanding The Opportunities

The U.S. Government is willing to establish reciprocal operating and/or third-party traffic agreements with other countries. Such agreements are negotiated through the U.S. Department of State. The support of the other country's amateurs is necessary to initiate meaningful negotiations. It is best to have action initiated by the country seeking to reach an agreement with the U.S.A., since their cooperation is essential in getting the task completed. Our government is receptive to providing draft notes, which could form the basis of such agreements, to any interested country. Notes can be requested from the U.S. Department of State or from the Federal Communications Commission. The FCC address is Washington, DC 20554, and requests should be directed to the Chief of the Spectrum Engineering Division. DX amateurs are urged to initiate appropriate action in their countries, if they do not presently have both agreements with the U.S.A. American amateurs could help expand these lists by discussing these agreements with foreign amateurs, particularly when visiting their countries.

Printed Aids

My previous columns contain information that is useful to new and aspiring amateurs. Many of these items have been reprinted for distribution to students of licensing courses I instruct. For ease of use, these printed aids have been separated into six categories. These categories are introduction, code, theory, station, operating, and miscellaneous. Outdated items are continually replaced with newer material. Fifteen dollars brings a complete set of current printed aids, including shipping costs. A list of these printed aids will be sent to anyone who requests it and sends a business-size (#10) self-addressed and stamped envelope to my California address. Licensing-course instructors are welcome to revise and/or duplicate these items to suit their requirements.

73, Bill, W6DDB

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LMR 400 DBL SHLD IIIA JACKET 2.7dB @450MHz	.62/FT	.60/FT
LMR 400 *UltraFlex* DBL SHLD "TPE" JACKET 3.1dB @ 450MHz	.75/FT	.72/FT
LMR 600 DBL SHLD IIIA JACKET 1.72dB @ 450MHz	1.47/FT	1.45/FT
LMR 1200 DBL SHLD IIIA JACKET 0.864dB @ 450MHz	4.55/FT	4.54/FT
COAX (HF GROUP)		
RG213/U MIL-SPEC DIRECT BURIAL JACKET 1.5dB @ 50MHz	.36/FT	.34/FT
RG8/U FOAM 95% BRD UV RESISTANT JACKET 1.2dB @ 50MHz	.32/FT	.30/FT
RG MINI 8X 95% BRD BLK, SILVER, or CLEAR UV RES JKT	.18/FT	.16/FT
RG214/U (2) SILVER BRAID SHEILDS MIL-SPEC	1.50/FT	1.35/FT
RG393/U DBL SILVER SHLD "TEFLON" 25,000 WATTS, @ 10MHz	4.00/FT	3.75/FT
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DACRON ROPE DBL BRD 3/16" 770# TEST	.12/FT	.10/FT
AUTOMOTIVE "ZIP" CORD		
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4:1-HCU50	50:12.5Ω	$49.95
9:1-HU50	50:5.56Ω	$49.95
1.78:1-HDU50 (2 Ratios)	50:28Ω 50:12.5Ω	$49.95
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CIRCLE 23 ON READER SERVICE CARD

AWARDS

BY NORM VAN RAAY, WA3RTY

NEWS OF CERTIFICATE AND AWARD COLLECTING

This month we salute a Canadian, USA-CA #736, Will Phillips, VE3FNM, who reached his goal on November 30, 1991.

Will Phillips, VE3FNM
USA-CA #736, 11-30-91

Will was born in Medford Ontario on June 13, 1920. Joe Couvillon, VE3CQ, introduced him to amateur radio in 1937. However, World War II intervened, and Will's amateur radio activity was restricted to reading radio magazines. His interest in electronics earned him a chance at Radar School. He was washed out, even though his fellow students were betting that he would receive advanced training and become commissioned. He later learned that the reason he was not accepted was that he corresponded with missionaries, and they felt he might have been a security risk.

After the war came college, and he received a degree in theology. However, he decided against the ministry as his life's work. He eventually found his occupation—technician for the Canadian Broadcasting Corporation.

During the winter of 1962-63 he finally got around to pursuing his love of radio. The Scarborough Amateur Radio Club conducted code and theory courses, and he obtained his Certificate of Proficiency. He purchased a TA12B transmitter and built a power supply for it. *The ARRL Handbook* had plans for a 40 and 80 meter receiver. He was on the air for less than $300 with a window antenna running from northwest to southeast. His first county contact was with KN3ZOL.

Next Will acquired a DX35 with a separate VFO, which enabled all-band operation. The first contact was on 15 meters with a young lady who signed "CZ." Will finally figured the "CZ" stood for Canal Zone.

The Department of Veteran Affairs helped Will purchase ten acres in Orono, Ontario. This permitted the installation of a Windom antenna 610 feet long. It was omnidirectional, and the 80 watts output equaled 800 at the antenna.

A heart attack in 1975 forced Will into a more sedentary life style with more time to pursue counties. The year 1983 brought another heart attack and quintuple bypass surgery.

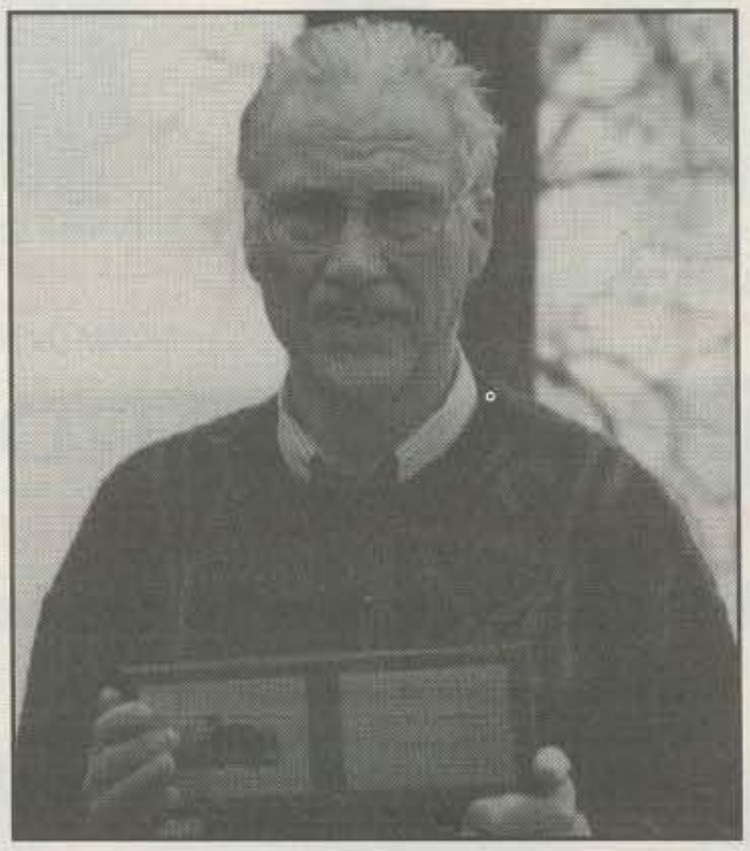
Will concludes, "Finally in November 1991 I achieved my goal. I had confirmed contacts with all 3076 counties of the United States. My certificate, USA-CA #736, arrived. I framed it, and it is in a place of honor in my shack.

"Amateur radio has been a wonderful hobby for me. I've spent countless enjoyable hours in my ham shack. I'm a member of many clubs, including YLISSB, Century Club, 10X, and OMISS, as well as MARAC."—73, Will, VE3FNM

Awards Issued

USA-CA 500: Paul Arnold, W3EVG, #2855; Mark E. Jenks, NZ9B, #2856; Jens Palle Moreau Jorgensen, OZ5MJ, #2857; Joseph L. Burton, Jr., N3KNX, #2858; Fred E. Levinson, KF9YL, #2859; Hren Ivan Spindlerjeva, S51ZY, #2860; Dalibor Sebestik, OK2BVX, #2861.

Box 76, Pleasant Mount, PA 18453-0076



Will Phillips, VE3FNM, USA-CA #736.

SPECIAL HONOR ROLL

Eugene Harrington, KE2FZ
USA-CA All Counties #869
May 22, 1995

HONOR ROLL

500

W3EVG	2855	KF9YL	2859
NZ9B	2856	S51ZY	2860
OZ5MJ	2857	OK2BVX	2861
N3KNX	2858		

The total number of counties for credit for the United States of America Counties Award is 3076. The basic award fee for subscribers is $4.00. For nonsubscribers it is $10.00. Initial application must be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 76 North Broadway, Hicksville, NY 11801 USA for $2.00. To qualify for the special subscriber rate, please send a recent *CQ* mailing label with your application. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 15, 1991. A complete copy of the rules may be obtained by sending an SASE to Norm Van Raay, WA3RTY, USA-CA Award Manager, Box 76, Pleasant Mount, PA 18453-0076 USA. DX stations must include extra postage for airmail reply.

Awards Available

1000 Jahr Krems Award. The city of Krems is celebrating its 1000th anniversary this year. For this reason the section Krems-Wachau (ADL 307) of the Austrian Amateur Radio Club (OEVSV) is issuing the Tausend Jahr Krems Diplom.

To qualify for this award you must confirm two-way (or SWL) contacts with amateur radio stations from the district of Krems from the period January 1, 1995 to December 31, 1995. The award manager is Michael Neubauer, OE3MNU, Limbergstrasse 39, 3503 Krems-Rehberg, Austria.

Requirements: All bands and modes are permitted. After 24 hours the same station may be worked again on another band or mode. OE3 stations need 10 QSOs; all other OE stations need 4 QSOs. European stations need 2 QSOs; DX stations 1 QSO.

To apply for the award send an extract from your log, confirmed by two other amateurs, to the manager (you need not send QSL cards). The fee for the award is ATS 100, DEM 15, US$10, or 10 IRCs.

Stations from the District of Krems, for which you get points are as follows: (OE3) ATS, AHB, BEA, DTA, ESA, FGA, GSS, GNA, HGB, HY, HZC, ISS, JSC, JTW, JYB, KGS, LJW, LUC, MNU, MS, NEA, OOW, PBU, PNU, PNW, RE, RTS, SAW, SGC, SPS, TFC, TR, WFB, WOC, WPS, YHS, YTW, YZA. These stations will be using the special suffix /1000 during the year 1995. The net profits will be used for maintenance and operation of the OE3XSA repeater.

All Portuguese Language Countries Award (PLCA). Required are confirmed contacts or SWL reports, on any authorized band or mode, with 10 countries of the world speaking the Portuguese language as listed below: C9 Mozambique, CT Portugal, CT3 Madeira Island, CU Azores Islands, D2 Angola, D4 Cape Verde, J5 Guinea Bissau, PY Brazil, PYØF Fernando de Noronha Island, PYØS St. Peter & Paul Rocks, PYØT Trindade & Martin Vaz Island, S9 San Tome & Principe, XX9 Macao.

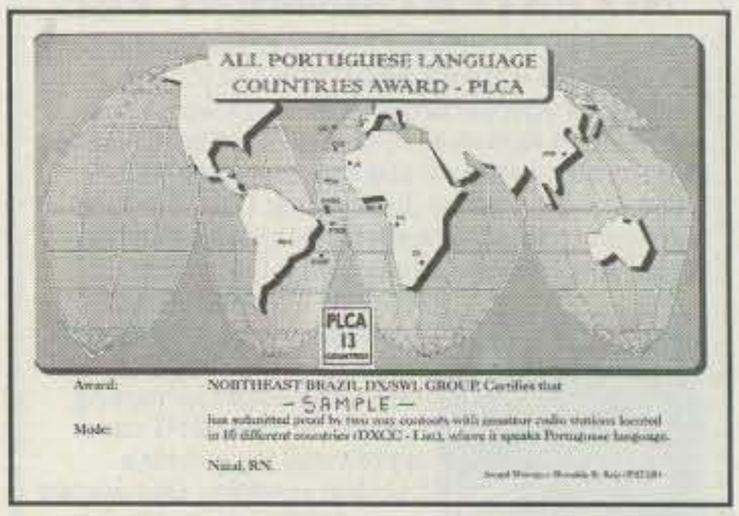
All contacts must be made from the same country. Contacts must be with land stations. Ships (anchored or not) and aircraft are not permitted.

PLCA will be issued to all licensed radio amateurs and SWLs. There are no time restrictions. An endorsement for contact with 13 (all) countries is available.

GCR lists are required; all contacts must be confirmed by QSL card. It is not necessary to submit QSL cards.

The fee for the award and endorsement is US$4.00 or 5 IRCs via air mail. Endorsement only ia US$1.00 or 1 IRC (wrap the fee in a piece of carbon paper to prevent tampering). PLCA is printed on 310mm x 215mm stock in two colors.

The award manager is Northeast Brazil DX/SWL Group, c/o Ronaldo Bastos Reis, PS7AB, P.O. Box 2021, 59094-970 Natal, RN, Brazil.



The All Portuguese Language Countries Award sponsored by the Northeast Brazil DX/SWL Group.

A QSL of Garry Hammond, VE3XN, features Eureka, NWT. Don't you feel cooler now?

Eternal Cities Award. This award is issued for confirmed contacts from cities which were founded before the birth of Christ.

European and Asian stations require 50 points; all others 25 points. A city which was founded in the first century BC counts 1 point; in the second century BC 2 points; in the third century BC 3 points; etc. A QSO with one of the eternal cities may be counted, any band, mode, and date. The same conditions apply for SWL contacts.

To apply send GCR list plus US$5.00 to UU5JFY, Victor Ganin via Hermann Warneke, Feuerwehrstr. 11, D-28857 SYKE – Ristedt, Germany.

Some of the oldest cities of the world, followed by point value: Athens (SV) 15; Ankara (TA) 7; Beirut (OD) 17; Bologna (I) 6; Barselona (EA) 3; Belgrade (YU) 5; Cologne (DK) 1; Damascus (YK) 11; Delhi (VU) 10; Feodosia (UB-UU) 6; Geneva (HB) 1; Istanbul (TA) 7; Jerusalem (4X) 2; Kerch (UB-UU) 6; Lisbon (CT) 2; Lyons (F) 1; Marseilles (F) 6; Milan (I) 5; Malaga (EA) 11; Nicosia (5B4, ZC) 7; Piraeus (SV) 15; Paris (F) 1; Pekin (BY) 15; Plovdiv (LZ) 4; Rome (I) 8; Samarkand (UI, 4K) 4; Sparta (SV) 7; Tunis (3V) 10; Tashkent (UI-4K) 1; Valencia (I) 2; Yerevan (UG, 4J) 8; Zaragoza (EA) 27.

The Eternal Cities Award.

On A Personal Note

Many thanks to all of you for your many expressions of concern about my physical problems this past winter. It *did* help.

I would like to expand the focus of the column to include other award-chasing amateurs in addition to CQ USA-CA Award recipients. If you would like to share your achievment with our readers, please send me your material and photographs. I'll edit it.

By the time you read this the annual convention of the Mobile Amateur Radio Awards Club (MARAC) in Hamburg, New York will be history. I'm sure we all had a great time.

Now that we are in the hot month of August in the Northern Hemisphere, I thought you all might enjoy the QSL card I received from Garry V. Hammond, VE3XN. The photo was taken April 14, 1988 by VE3XN at Eureka, NWT, a nine-man weather station at 80 degrees north latitude on Ellesmere Island (NA-008 for IOTA), while he operated as VE3XN/C18. Garry was one of the radio operators who provided communications support for the historic joint CANADA-USSR 1988 "Polar Bridge" SKITREK Expedition across the Arctic Ocean. Now don't you fell cooler?

73, Norm, WA3RTY

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CIRCLE 61 ON READER SERVICE CARD

PACKET USER'S NOTEBOOK

CONNECTING YOU AND PACKET RADIO IN THE REAL WORLD

BY BUCK ROGERS, K4ABT

What's A K-Net? The Best Yet!

What do you get when you cross the Kantronics KPC-9612 and TheNET/X-1J node? A K-NET!

Merged into one package, Kantronics has taken their best shot and come up with a winning combination of a feature-packed packet controller and a dual-speed, 9600 and 1200 baud TheNET/X-1J, and NET/ROM™ compatible backbone node and gateway.

Before we dive headlong into the how-to of the K-NET node, let's look first at a few of the features found in the KPC-9612 as it is supplied straight out of the box.

We all like to move our data faster. Even 2400 baud is faster than 1200 baud; 4800 baud is four times as fast, but how about eight times faster? Now that'll out run a Studebaker! The best part is that we can move 30 minutes of data in less than 5 minutes. And the KPC-9612 is compatible with the G3RUH 9600 baud modem design, which is now the worldwide AX.25 packet standard.

Not long ago we found it easy to put a packet station on the air at 1200 baud. Now that we have moved to a second and faster primary baudrate, we are encountering a bit of a problem. As I discussed in the June 1995 column, that problem is slowly going away, however. For one thing, Kantronics has addressed the radio problem with the UHF transceiver (D4-10), while some other manufacturers are taking steps to support the move to the higher 9600 baudrate.

With 1200 baud we had a traditional packet mode that used 1200 Hz and 2200 Hz audio tones that would easily pass through our VHF transceiver microphone and speaker I/O. Piece of cake. Then came 9600 baud, and we soon discovered there would be a need to connect the transmit audio directly to the frequency modulating (VARICAP diode) element in our FM transceivers.

The receive audio to the TNC's modem had to come directly from the transceiver's receive discriminator circuits. It wasn't long ago when we had to do a hatchet job to modify our rig for use at 9600 baud. Recently, though, we found several 9600-baud-ready radios suitable for this purpose: the Alinco DR-150T (VHF) and DR-610T (VHF/UHF), Azden PCS-9600D (UHF), ICOM IC-281H (VHF), Kantronics D4-10 (UHF), Kenwood TS-251 (VHF), MFJ-8621 and 31 (VHF), and Yaesu FT-2500, to name a few. Most of these units have separate 9600 baud I/O ports ready to plug-n-play.

Speed-Shifting

The KPC-9612 is a single TNC with two ports both operating at either 1200 or 9600 baud. We can use the hard way to switch between baudrates simply by entering the port number and resetting to the new port, or use the easy method—the stream switch character(s).

The Kantronics KPC-9612.

Applying the easy way means that we use the default stream switch characters, the tilde (~ for 1200 baud/port 1), or the vertical bar (| for 9600 baud/port 2). In either case the 1200 or 9600 baud rate can be accessed using a quick keyboard command.

"NEWUSER"

Before we get too carried away with this fun machine, I need to point out some of the more outstanding features of the KPC-9612. The Kantronics NEWUSER command (default setting) enables the new packet radio user to get started on packet with a subset of the larger command set in the KPC-9612. The INTERFACE command allows the seasoned packeteer to access the Terminal mode or KISS mode, etc., simply by choosing any one of the six available commands. Again, it's a simple keyboard command to the KPC-9612 that allows the operator to rise to the next operating level of packet.

"ONERADIO" or Two

The KPC-9612 offers the capability of simultaneous 1200 and 9600 baud operation using two separate radios or a single radio. When using only one radio, both the 1200 and 9600 baud ports are wired together. When an incoming connect request or signal is heard, the KPC-9612 automatically detects speed and selects the correct port for the incoming signal. With either the KaNode or the K-NET firmware (adding the K-NET EPROM; later in this article) the internal firmware and software give other packet users the capability to cross-connect out the adjacent port at another baudrate and/or frequency.

Using the KPC-9612 with both ports connected to one radio, the ONERADIO command of the KPC-9612 must be set to ON. An example would be with the 1200 baud port (DE9) connected to the mic input and the 9600 baud port (DE15) connected to the same radio but using the 9600 baud I/O *(modulator (I/O) discriminator)*. In addition to setting the ONERADIO command ON, if your radio has no squelch control or you are operating "open squelch," then set the CD command to software. You'll note that the software command is active on the 1200 baud port only.

PBBS

The KPC-9612 is equipped with an internal personal mailbox which offers all the latest forwarding and reverse-forwarding features. If you are operating on a local area network PBBS, then I suggest you add the 128K RAM. This way you can store over 100,000 bytes of messages and text to and from area users.

Interfacing The KPC-9612

The KPC-9612 can operate from any 7 to 24 volt DC power source. I have one of my KPC-9612's operating from an internal (easy to install) 9 volt battery. Current drain is less than 45 ma. All input/output (I/O) is made at the rear panel of the KPC-9612 (see fig. 1).

Also on the rear of the KPC-9612 are three D-type connectors which allow interconnection(s) to one or two transceivers with the DB25 connector interfacing to the terminal or computer as required. The reason I say "as re-

Fig. 1– The rear of the KPC-9612 has all input/output connections readily accessible to the user. The ON/OFF switch is on the front panel.

211 Luenburg Drive, Evington, VA 24550

**NET/ROM is a trademark of Software 2000.*

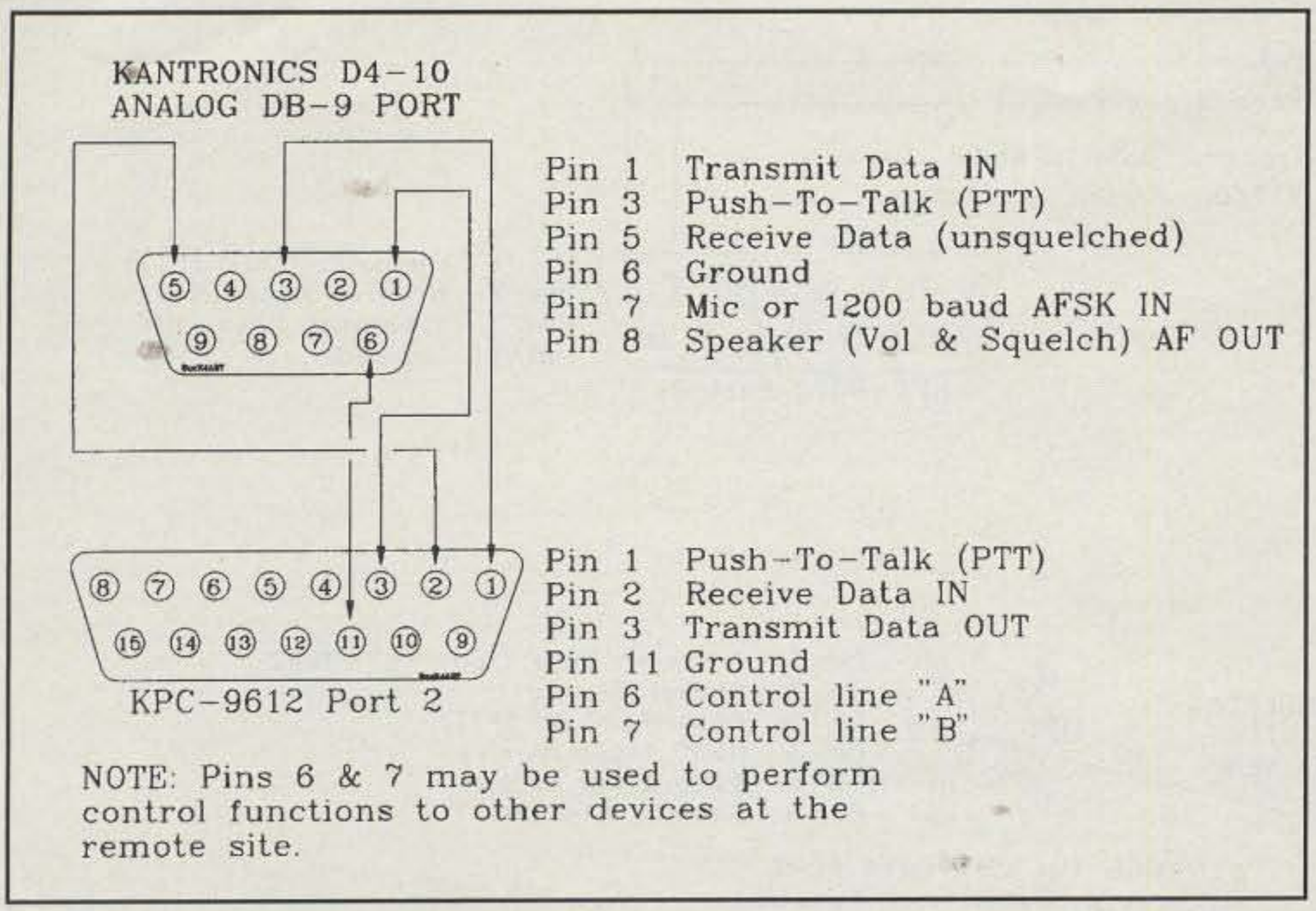

Fig. 2– The KPC-9612 is easily interfaced to the Kantronics D4-10 UHF transceiver. Additional device control is available at pins 6 and 7 as control line "A" and device control line "B."

quired" will become obvious as we begin the section of this month's column about how we use the KPC-9612 as a K-NET network node.

DE9, the 9-pin connector shown as port 1 in fig. 1, is provided for 1200 baud PTT, transmit AFSK, and receive data. DE15, the 15-pin D connector, is the radio interface port for 9600 baud. The real reason for the two different-size connectors is in the applications that are available from the 9600 baud operation of the KPC-9612.

Here is another note of interest to remote site repeater operators. Notice in the user's manual that pins 6 and 7 of the DE15 have device or machine control lines available to allow external control of other devices at a remote repeater site.These control lines may also be used to control devices other than packet.

Initializing The KPC-9612

Fig. 1 provides a quick reference to the port assignments. In figs. 2, 3, 4, 5, 6, and 7 I've included enough interface information to enable the new KPC-9612 owner to have the unit on the air at 9600 baud with hardly any effort.

Once you have the KPC-9612 interfaced to your terminal and transceiver(s), the rest is easy. Boot the terminal or terminal program (a disk with a terminal program is included for the IBM PC and compatibles) and turn on the KPC-9612. The 9612 will exercise an AUTOBAUD routine, and at any time you may press the asterisk (*) and the AUTOBAUD will lock and ask you to enter your callsign. From this point forward you are in control.

If for any reason you find a need to do a hard reset of the KPC-9612, follow the procedures outlined on page 77 of the KPC-9612 manual. Use the default terminal baudrate of 1200 baud and watch as the hard reset signs on and initializes the RAM. When adding more RAM or when installing the K-NET EPROM, use the same procedure after the RAM or EPROM installation. The sign on will also indicate the RAM size as it performs the hard reset. Be sure to return J15 to its normal position (on one post only) after performing the hard reset. At turn-on the KPC-9612 defaults to the monitor mode. Any packet signals being heard on frequency should be displaying on the screen.

I can go on and on about the use of the KaNode, PBBS, remote access, and remote control, but I have something much more interesting about the KPC-9612 to cover.

K-NET'ing

Don't even think about taking your eyes off this article now, as I'm about to let you discover one of the most versatile TNCs available today to the packet user and system node operator.

Because the interest in 9600 baud is high on our packet lists, I've included several diagrams for interfacing the KPC-9612 to some of the 9600-baud-ready transceivers. I did not draw many interface drawings for 1200 baud ports, as they are plentiful in many of my books and previous columns.

For openers, if you plan to implement this new firmware, it would be in your best interest to become familiar with the use and application of NET/ROM and TheNET derivatives. Although the high-speed port (port 2) of the KPC-9612 is capable of operating at 4800 or 9600 or 19,200 baud, this column will refer to operation at 9600 baud. The K-NET PROM **must** be installed in a KPC-9612 controller. It *will not operate* if it is installed in any other TNC.

At least one transceiver is required to enable K-NET operation. Most of the time a second transceiver is used to take advantage of the full potential of K-NET. Usually a 2 meter transceiver is connected to port 1 (1200 baud) of the KPC-9612, and a special "data-ready" radio, capable of operating at 9600 baud, is connected to port 2. A computer running a terminal program must be used to initially configure the KPC-9612 for K-NET operation. Since K-NET operation requires more RAM than tradi-

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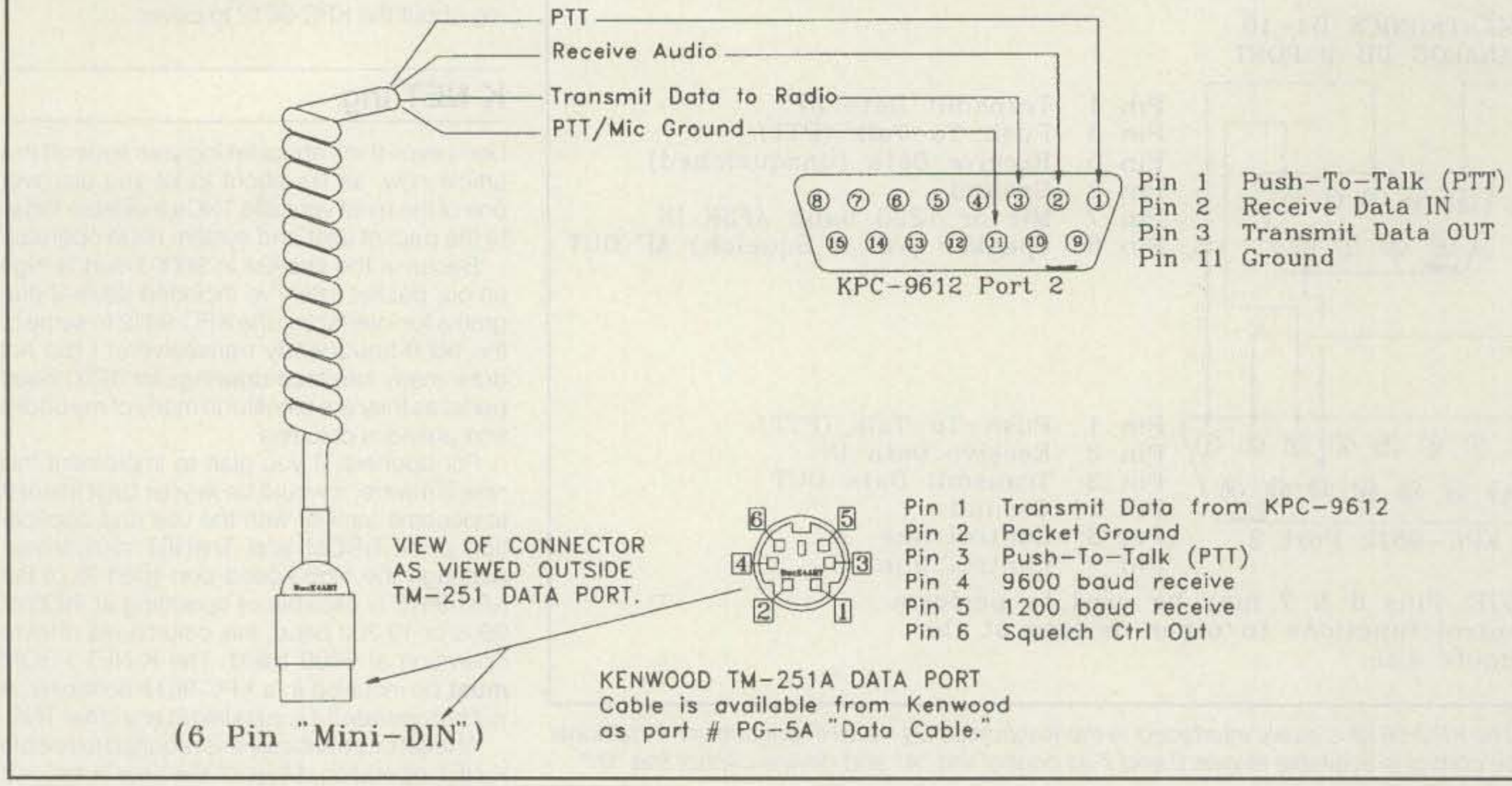


Fig. 3– This interface to the Kenwood TM-251 requires the new 6-pin "mini-DIN" connector. Finally, some semblance of a real 9600 baud standard connector appears ahead. Note the same pin-out is used on the Azden PCS-9600D.

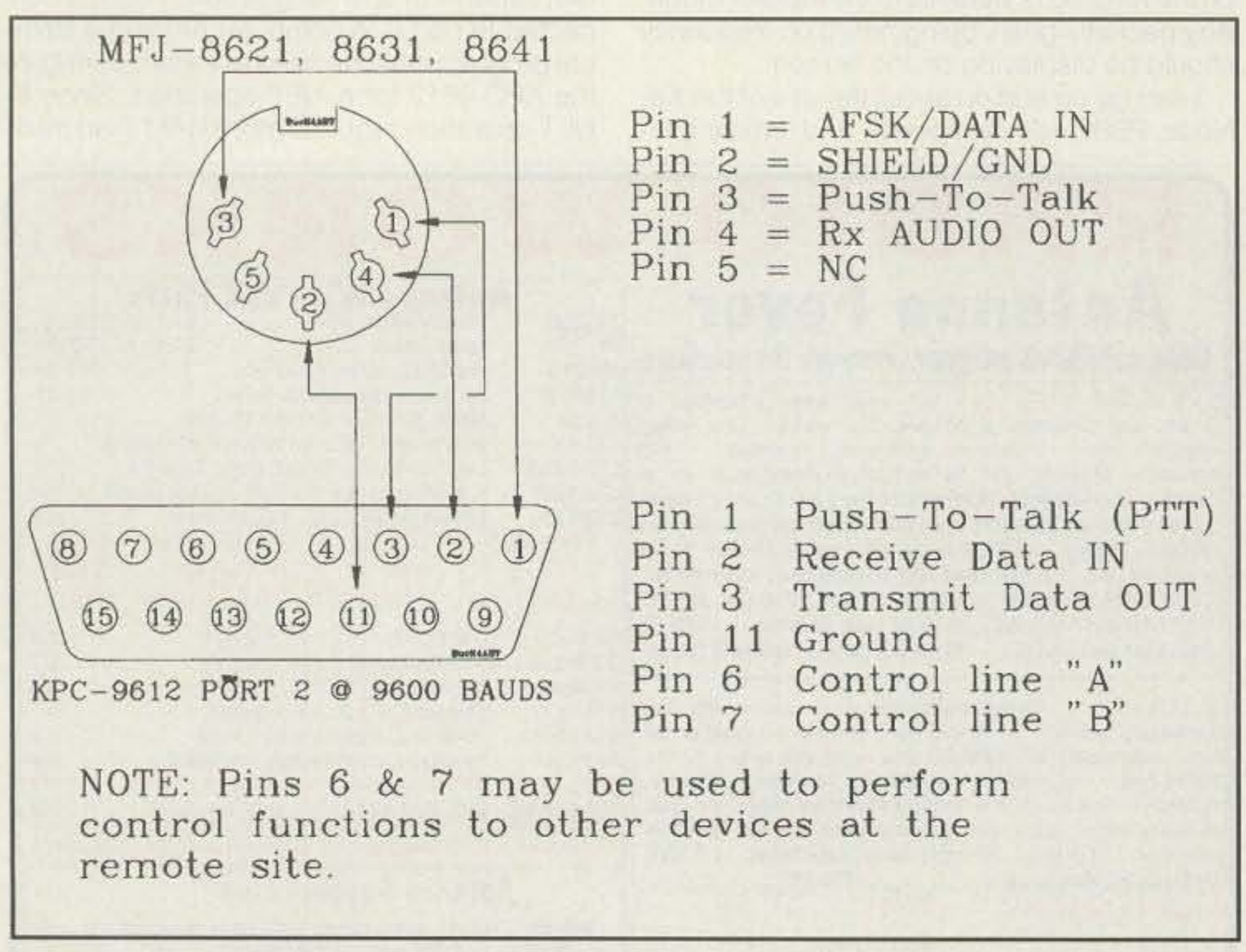


Fig. 4– This interface depicts the KPC-9612 interfaced to the MFJ-8621. The 1200 baud port may be sent to the 8621 set for 1200 baud operation, while the 9600 baud port is sent to an MFJ-8631, 223 MHz transceiver.

tional TNC operation, additional RAM is recommended to allow for a larger PBBS. The 128K static RAM chips are available (optional, but recommended) from Kantronics.

A Basic Introduction To Packet Networking

A network node is a "collection point" in a packet network. It is at these node locations that packets are collected and routed to other nodes and end-users. Many network nodes operate at high data rates—usually at 9600 or 19,200 baud. End-user access to the network is usually at a lower baud rate (1200 baud) and on a different frequency. The advantage of a network system is two-fold—automatic routing of connections to other network nodes and increased data throughput. A network node "knows" how to automatically route data through neighboring nodes to distant nodes on the network. They do this by "hearing" other nodes broadcast this information. This means that a user connected to a node does not need to specify the particular route to take in order to reach a distant node as long as the local node contains a listing for that distant node. Using a network node can also dramatically increase the data throughput to distant locations. The packet data and acknowledgments travel from node to node (rather than from end to end), greatly reducing the inevitable data collisions that will occur when attempting to communicate over long distances.

Some network nodes have more than one radio port in order to provide a high-speed network "backbone" on one frequency, as well as Local Area Network (LAN) access to the high-speed network at a lower data rate on a different frequency. This approach to packet networking makes good sense for a number of reasons. First, the high-speed backbone is free to pass large amounts of data without competing with end users for the channel. Generators of large amounts of data are called *servers.*

Guidelines For Packet Networks

Certain goals and concepts of network design should be carefully studied when installing a new node into a packet network. The primary goal of any data network should be the efficient transfer of data from point A to point B (high speed), coupled with ease of use (low frustration level). The efficient transfer of data is made possible with the advent of high-speed modems and "data-ready" radios capable of operating at 9600 and 19,200 baud.

Here in the southeast (from Maryland to

Orlando, Florida, and the east coast to Nashville) the SouthEastern Digital Association Networks (SEDAN) is building high-speed links which operate on dedicated backbone frequencies. This requires that no stations other than network nodes and servers reside on the backbone channel. Each node on the backbone must have a solid link to the next, preferably on alternating, or full-duplex channels, for maximum data transfer efficiency.

All users in an area are grouped into Local Area Networks (LANS), with each LAN assigned a specific operating frequency such that adjacent LANS will not interfere with each other. For most of the southeast each LAN should have a user port at a local network node that will allow access to servers and other LANS in the region. In reality, much of the above is quite difficult to achieve. Obstacles include finding suitable node sites, available funds for equipment, and dealing with the differing philosophies and interests of other node SYSOPs. There are many differing opinions on how to go about achieving "Network Utopia," but virtually all of them have one goal in common—*making packet radio fun!*

K-NET PROM Installation

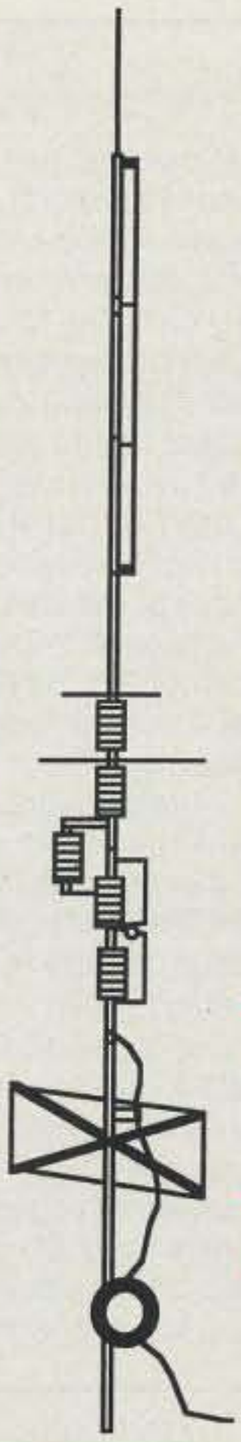
The K-NET PROM adds the function of a dual-port network node to the operation of the KPC-9612. *All original features of the 9612 are retained,* including your PBBS, simultaneous dual-port keyboard operations, and remote access. This means that you can still use the KPC-9612 as you do now, and add the K-NET PROM, to provide your local area with a dual-port network node that operates in the background of your normal TNC operations!

The K-NET here at our QTH is operated by my wife, Jean Ann, as WB4EDZ-7 with the alias of "EVA" (alias for Evington, VA). The node is fully compatible with the rest of the 100-plus nodes on the SEDAN. It uses the same basic network protocol, but with the added flavor of providing both a 9600 baud port and a 1200 baud port that add to our existing SouthEast Digital Association Networks. The 9600 baud port (2) is operating as a UHF backbone node, while the 1200 baud port (1) is providing user access from (VHF @ 145.770 MHz) 1200 baud SEDAN node(s). The 1200 baud node also provides a node that is available for user access to other nodes and users on 145.770 MHz.

Please note that after the K-NET PROM is installed, the KPC-9612 will power up in the AUTOBAUD mode, and all commands are reset to factory defaults. Before you install the K-NET PROM, it's a good idea to use the DISPlay command and make a print-out (or disk file) of your parameters.

To install the K-NET PROM you will need to remove the cover of the KPC-9612, locate and remove the old PROM (U19), insert the new K-NET PROM, perform a hard reset, and then reattach the cover as follows:

1. Turn off the KPC-9612.
2. Remove the two screws (one on each side) that secure the top cover to the case and remove the top cover.
3. Observe proper anti-static precautions and remove the PROM from socket U19. The PROM has a white Kantronics label on the top.
4. Carefully insert the new K-NET PROM in socket U19, ensuring that pin 1 (notch end) of the PROM is located closest to the large notch in the PC board near the battery. Also note that



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#CAV-154-3-1	25-500pF @ 2kv (.045")	$55	(3-12)	$52
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the new PROM is physically larger than the old one. The K-NET PROM will use all 32 pins of the U19 socket. When inserting the new PROM, be careful not to bend any of the pins underneath the PROM.

5. Perform a hard reset as described on page 105 of the KPC-9612 reference manual and reassemble the KPC-9612.

Making The K-NET Happen

The factory default values in the K-NET PROM have the network node operation disabled. To enable the K-NET node, the NETALIAS and the NETCALL must be entered. It is assumed that you are connected to the RS232 port of the KPC-9612. Many of these commands and features may be set after the K-NET node is relocated to the remote site. However, the user must be the node SYSOP and give the appropriate password (RTEXT).

The NETALIAS is usually a mnemonic that gives users an idea about where the node is located (other network nodes do not care what the alias is). For example, SUTNE is a good NETALIAS for Sutton, Nebraska. The NETCALL is the callsign of the node. The NETCALL consists of your callsign plus an optional SSID (example, KAØDNV-1). It *must* be different from any other callsign used in the KPC-9612 (MYPbbs, MYGate, MYAlias, MYNode, etc.).

Use the DISPlay Id command to make sure that the NETCALL you select is different from the other callsigns that are in use by the KPC-9612. Many times local "customs" will serve as guidelines for what NETALIAS and NETCALL to use. In the paragraphs that follow all callsigns and aliases are examples only. When building your KPC-9612 node(s), use the call- signs and aliases applicable to your node and area.

Enter the NETALIAS:
At the cmd: prompt Enter> **NETALIAS SUTNE**
Note that this is a dual-port command, allowing a different NETALIAS on each port.

Next set the NETCALL - cmd:
NETCALL KAØDNV-1

This command will cause the KPC-9612 to perform a soft reset as memory is allocated for node operation. Your K-NET node is now in operation! There are six additional "NET" commands that are only available from the command prompt of the KPC-9612. These commands and their current settings can be displayed with the DISP N command.

Most other node commands are accessed by connecting to the node either locally with your terminal, or remotely. If connected remotely, SYSOP access (see SYSOP command) is required to list and change SYSOP-related parameters. *Note:* RTEXT command in the KPC-9612 *must* be set to allow remote SYSOP access).

When you connect to your K-NET node, you will *not* receive a command prompt (cmd:). Hitting the ENTER key will display the commands available to you. To see the current setting of any of the commands just enter the command and hit the ENTER key. Whenever you are at this "invisible command prompt" you automatically have access to the entire command set, since you are assumed to be the SYStem OPerator (SYSOP).

A short help description of each command is available by entering H(elp) or ? followed by the node command. The entire HELP contents can be displayed by entering H H<cr>.

Table I is a display Jean Ann receives from "EVA" K-NET after she connects and enters the SYSOP mode (password level); she sends the node H H. If she is not in the SYSOP mode and she issues the "H H" request, the node will respond with an abbreviated (user) subset of these commands. The M or Mheard command may be sent to the K-NET in either of two ways.

H H	
EVA:WB4EDZ-7}	
ADDNODE	[alias:]call port neighbor [via digi1[,digi2]] quality [obscnt]
ADDROUTE	port call [via digi1[,digi2]] quality [!]
BYE	causes this node to disconnect you
BBS	[/S] causes internal connect to BBS
CONNECT	[[port] calllalias [/S]] to host or another node or end user
CQ	[UI text] puts you in CQ mode
CQBC	enables UI broadcasting for CQ command
CTEXT	Text sent first to someone else connecting to NETALIAS
DELNODE	[alias:]call port neighbor [via digi1[,digi2]]
DELROUTE	port call [via digi1[,digi2]] quality
INFO	Data sent in response to INFO command
IDINT	Number of minutes between node id (0–255)
LINKS	Status of level 2 links
L3TTL	Max # of L3 hops (0–255)
L4DELAY	Level 4 acknowledge delay in seconds (1–60)
L4LIMIT	No activity timeout in seconds (0-65535)
L4N2	Level 4 retry count (1–127)
L4T1	Level 4 retry timer in seconds (5–600)
L4WINDOW	Max # of unacked packets for each circuit (1–127)
MHEARD	[LONGISHORT] Displays list of callsigns heard
MINQUAL	Minimum quality in order to add to Nodes table
NODES	[{* I alias I call}]
NODESINT	Number of minutes between node broadcasts (0–255)
OBSINIT	Initial L4 obsolescence value (0–255)
OBSMIN	Minimum obsolescence count in order to broadcast (1–255)
QUALITY	Port quality
PORTS	Displays messages about radio ports
ROUTES	Displays neighbors
STATS	Displays users connected to node
SYSOP	Allows log-in of authorized SYSOP

Table I– A sample display my XYL Jean Ann, as WB4EDZ-7 receives from "EVA" K-NET. After she connects and enters the SYSOP mode (password level), she sends the node H H.

TheNET X-1J/K-NET CROSS-REFERENCE GUIDE

	X1-J PARM	K-Net COMMAND
1.	Max. Destination Node Size	NETDest
2.	Min. Auto update quality	MINqual
3.	Neighbor default quality	Quality
4.	RS-232 default quality	N/A
5.	Initial obsolescence count	Obsinit
6.	Min. Obs. count to broadcast	OBSMin
7.	Node broadcast interval	NODESInt
8.	Initial Time-to-Live	L3ttl
9.	Transport Frack timeout (sec)	L4T1
10.	Transport Retry counter	L4N2
11.	Transport Ack Delay (sec)	L4delay
12.	Transport Busy Delay (sec)	N/A
13.	Transport Window Size (frames)	L4Window
14.	Transport Overfill Limit (frames)	N/A
15.	No Activity Time Out	L4Limit
16.	Persistence	cmd: PERsist
17.	Slot	cmd: Slottime
18.	Link Frack (T1)	cmd: FRrack
19.	AX.25 Maxframe	cmd: MAXframe
20.	AX.25 Retries	cmd: RETry
21.	Link Response Time (T2)	N/A
22.	Active Check (T3)	cmd: CHeck
23.	AX.25 Digipeat	cmd: DIGipeat
24.	Validate Callsigns	N/A
25.	ID Beacon	cmd: IDINT
26.	CQ Broadcasts	CQBc

Table III– A cross-reference guide to assist in the configuration of node parameters if an X-1J node is located in your area.

Say You Saw It In CQ

M S(hort) will return a list of recent "heard" stations without their paths to the node, while issuing an M L(ong) to the node returns a long list that also gives the paths that were used by the "heard" stations. Also, this long list will contain the port number they were heard through—e.g., port 1 = 1200 baud; port 2 = 9600 baud.

The same node list format is displayed when we pull a nodes list from the K-NET node "EVA" (see Table II).

Fine-Tuning Your K-NET Node

Although the default parameters of the K-NET node will get you "up and running," there are some guidelines that can enhance the desired operation. Good neighbor relationships are really the key to good networks. This takes the form of proper quality settings for your neighbor nodes, as well as good relationships with your neighbor SYSOPs. If your node table has a consistent listing of destination nodes that have reliable paths, users will not be frustrated, and your node will be perceived as working quite well.

After the K-NET node has been running for a while using the default parameters, some "tweaking" of commands is in order. *The Quality settings for your neighbor nodes will have the largest impact on the usefulness of your node.* Remember: The quality number determines how far away a node will be visible in the network and the order of automatic route selection.

The routes table contains the information that will help you as you change the default settings. The Quality assigned to your neighbors listed in the Routes table can be changed to achieve the desired node setup. There are two very general philosophies that will help you determine how to "finalize" and maintain your node.

Static Node

The default values for the K-NET node will cause every neighbor node that you hear to be included in both the route table and the node table (Quality = 70/110 and MINQual = 70). Initially, this may be a bit of a problem, since weak neighbor nodes and their distant nodes may be saved in your node table. Try to connect to all the neighbor nodes that are listed in the routes table. Be sure that you have set the number of Net routes such that all neighbors will be included. Make note of which nodes respond with a good signal and modify the route table with the ADDRoute command to set and lock the quality of these nodes to a number higher than either value automatically assigned by the Quality command for either port. For example, if the Quality command is set to 70/110, and all good routes are locked at a Quality of 115, setting MINQual to 115 results in a static node that is only aware of the neighbor nodes that you have "locked in." This node will *never* have any new neighbor nodes *or* distant nodes automatically added to the node table. If distant nodes are to be listed in the node table, they must manually be added to the node table using the Addnode command, listing one of the existing neighbors as the route. Since distant nodes may have multiple paths from your node, the preferred route and alternate route(s) to a distant node can be specified with multiple Addnode commands.

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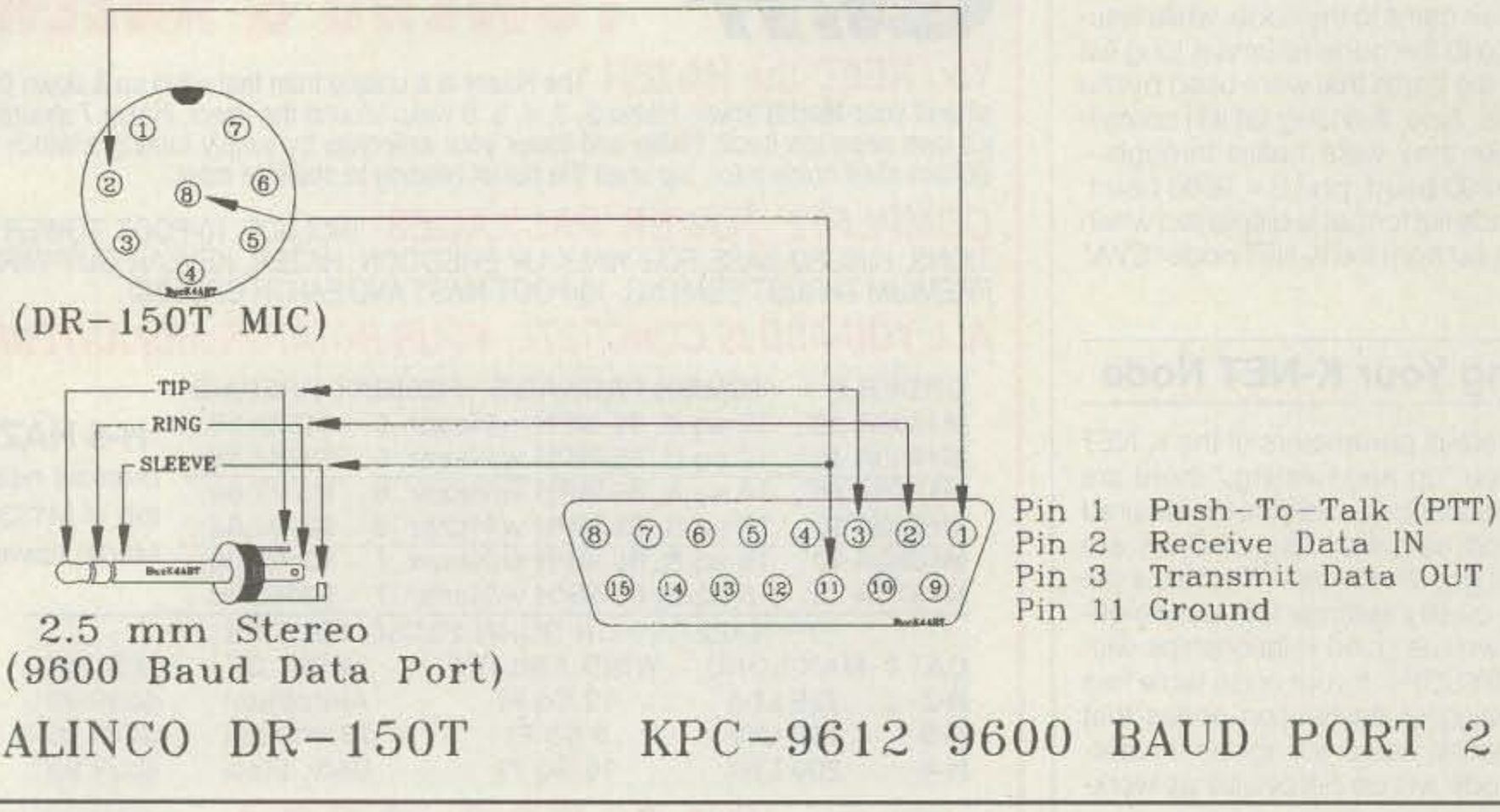

Fig. 5– Another newcomer to the high-speed data transceivers. The Alinco DR-150T can operate with both ports of the KPC-9612 attached. Use the DR-150T microphone I/O for 1200 baud and the 9600 baud data port for KPC-9612, 9600 baud I/O.

When connections to these distant nodes are requested, your node will *always* use the locked route path(s) in spite of changing band conditions.

Part of the responsibility of being a node SYSOP is maintenance. It's probably a good idea to set MINQual equal to or less than Quality from time to time in order to see if any new neighbor nodes appear in your route table. If a good path to a new neighbor shows up, lock the new node route with your "good" neighbor Quality and then reset MINQual to its previous value.

Dynamic Node

The default values for Quality and MINQuality will allow *all* neighbor nodes that are heard to be listed in the node table. This means that both good and marginal neighbors will be listed in the node table. Of course, the node table will be larger than with the static node settings, but the benefit obtained is that the node will know when new neighbors appear and then automatically include them in the node table.

Although distant nodes that may have good

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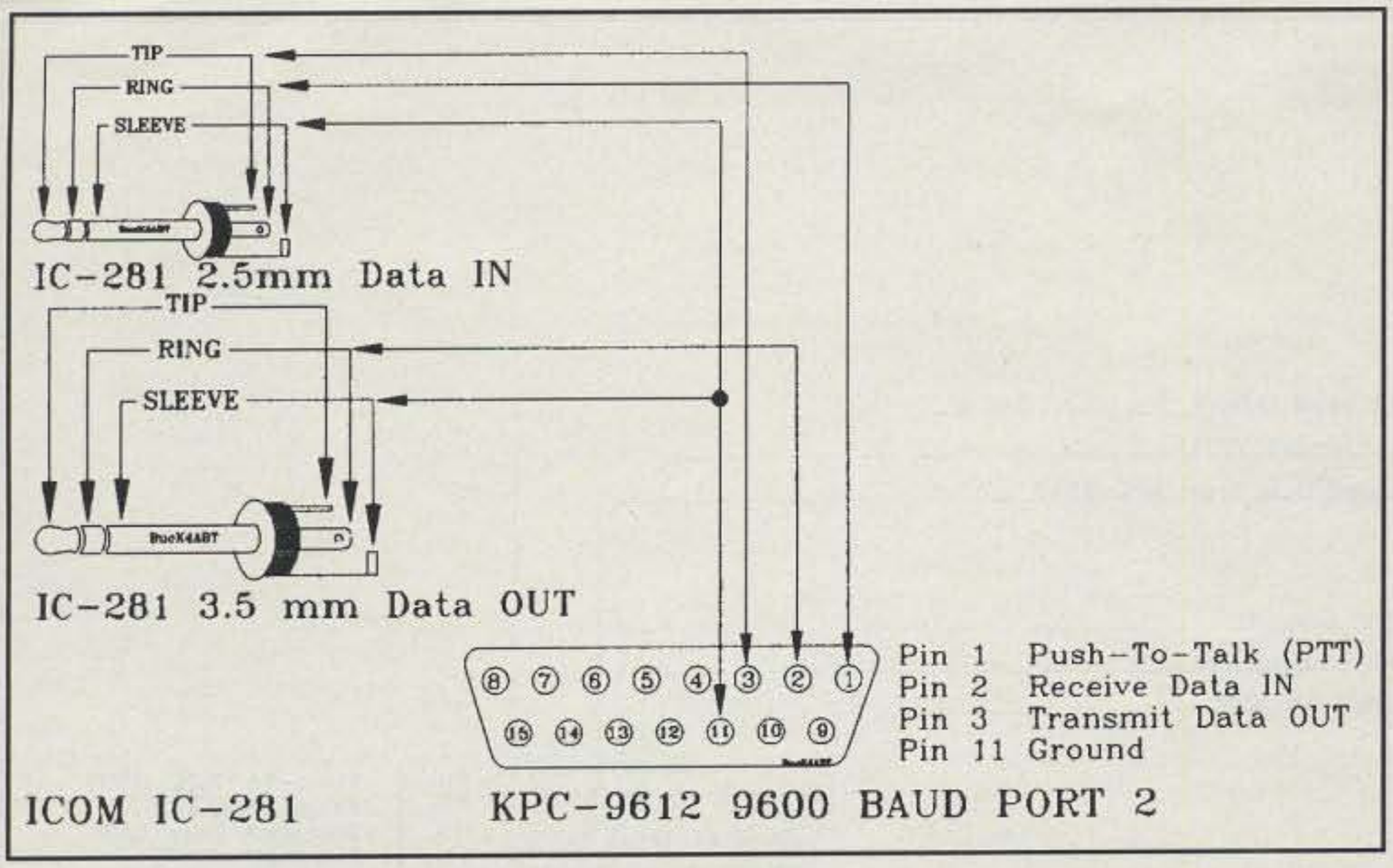

Fig. 6– The KPC-9612 interfaced to the ICOM 281H. Note the Data Port of the IC-281 is used. Also set the transceiver according to the IC-281 manual for 9600 baud operation.

routes from your node will not be listed, some SYSOPs feel that this is one method to control the propagation of marginal nodes. The dynamic approach allows the node table to be elastic. It will grow as previously unknown neighbors appear, and shrink as the obsolescence counters for each route decrement.

Once the K-NET node has been in operation for a while, and you have noted your "good" and "not so good" neighbors, a combination of static and dynamic settings can be used. By locking in "good" neighbors at high-quality values, you can force the routing logic to take a preferred route in spite of changing band conditions. Once "good" neighbors have been established, the Quality to assign to each neighbor will have to be determined experimentally in order to control the listing of marginal destination nodes that will appear as a result of receiving neighbor node broadcasts.

Allowing destination nodes that are more than three or four hops away to appear in your node table will result in *very* large node tables being generated. When your node receives a node broadcast from a neighbor node, it will automatically calculate a quality to all the nodes contained in that broadcast.

If the computed quality is less than MINQual, that distant node is not added to your node table. Therefore, it is desirable to have a combination of Route quality and MINQual that will only allow nodes that are three or four node hops away to appear in your node table.

As an example, if your "good" neighbor node (A) has a "good" neighbor node (B), and node (B) has a "good" neighbor node (C), your node has a good chance of reliably reaching node (C). The computed quality at your node for distant node (C) must be greater than MINQual in order for it to be listed in your node table. If a quality of 70 is assigned to all neighbors in this example, your node will assign a quality of 5 for distant node (C), computed as follows (it helps to draw this out on paper): The quality from (B) to (C) is 70, when (B) broadcasts (C)'s quality as 70, (A) multiplies 70 by 70 and divides by 256 to arrive at a quality of 19 for (C).

When your neighbor (A) does a node broadcast, his broadcasted quality of 19 for (C) is multiplied by your path quality for (A) and divided by 256, resulting in a quality of 5 for distant node (C) (19 times 70 divided by 256). Since 5 is probably below your MINQual, distant node (C) will not be listed in your node table even though it is probably usable.

What to do? You could change the Quality to your neighbor (A) to 255. This will result in your node assigning a quality of 18 for distant node (C), but it does not leave much room for a special-case route that may be 5 or 6 hops away. This will also cause your neighbor (A) to propagate farther than desired in the network, creating useless routing. As a compromise, lock the quality of (A) to 140.

If your neighbor node (A) also locks in a quality of 140 for his neighbor (B) and node (B) does the same for node (C), then your node will now assign a quality of 41 for distant node (C), leaving some "margin" for other nodes as they join the network. Now a MINQual setting of 41 will allow these "good" distant nodes to be listed in your node table.

The quality values used in these examples were not just "picked out of the air"; 140 is a *reasonable* quality to assign to a good 1200 baud neighbor, since this allows good distant nodes to appear in your node table while also limiting node propagation. It also leaves room in the quality range (0–255) to assign higher qualities to preferred 9600 baud neighbors.

Generally speaking, 9600 baud routing should be used whenever possible, since this has the effect of "unloading" the Local Area Network. Locking in a quality of 200 to "good" 9600 baud neighbors will have the same general benefits of the 140 setting on the 1200 baud port—reliable paths to good destination nodes, limiting of node propagation, and still leaving room in the quality range for ultra-reliable routes and even higher node speed preferences (remember, the KPC-9612 can operate up to 19,200 baud).

This is where good neighbor relationships with other SYSOPs in your area become important. Neighbor node quality must be continually examined in order to arrive at a usable network configuration that makes good use of all possible paths. Coordination of efforts and philosophies should result in an expanding network that is low in frustration and fun to use.

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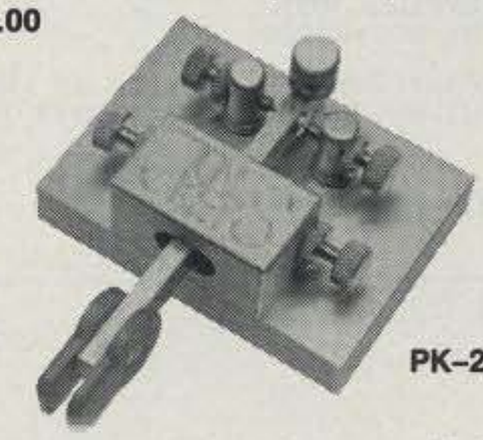

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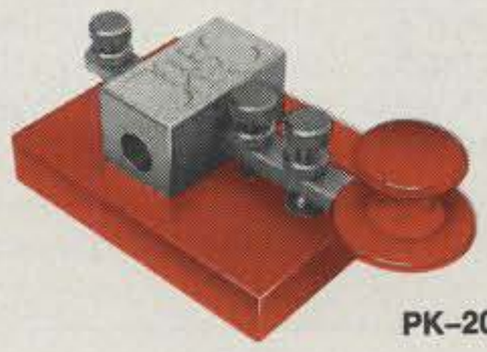

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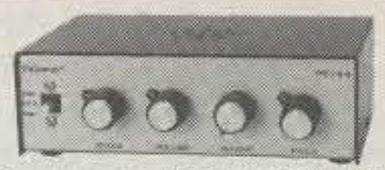

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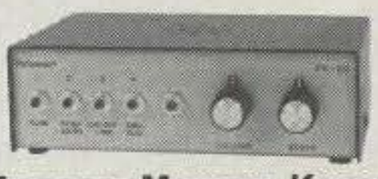

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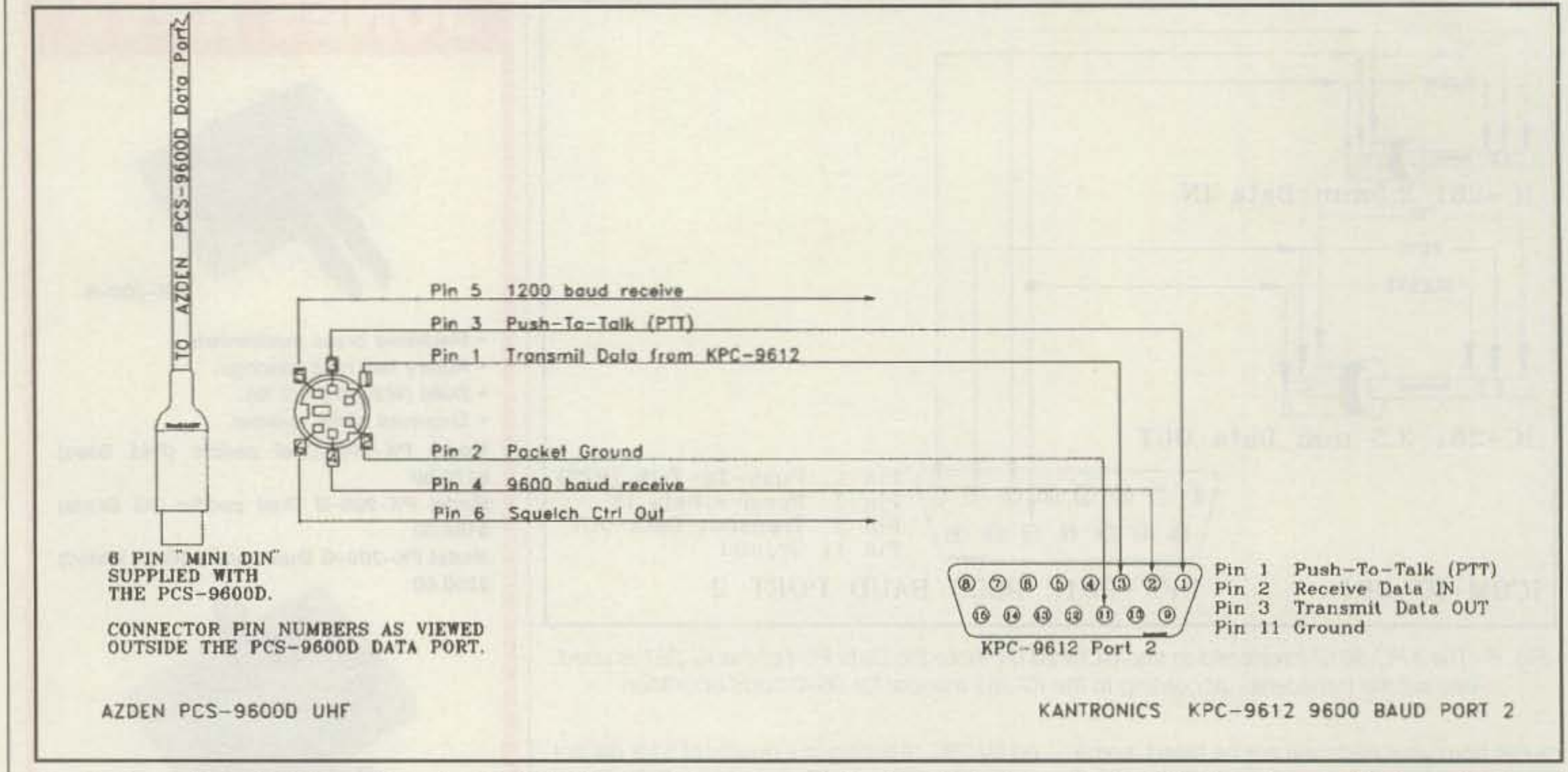

Fig. 7– For really fast TXD switching, the PCS-9600D stands toe to toe with the best. In tests here in the SEDAN test-bed, TXDelay switching of 5 (50 milliseconds) is not uncommon.

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Table II– Node list format displayed when we pull a nodes list from the K-NET node "EVA."

Table III is a cross-reference guide to assist in the configuration of node parameters if an X-1J node is located in your area. The *basic* X-1J PARMS can be listed by connecting to an X-1J node and giving the P command. This should precipitate meaningful discussion among node SYSOPs in an attempt to arrive at a "Network Standard" of node parameters that benefit all users.

Summary

For packet operators who already own the Kantronics KPC-9612, the K-NET EPROM is available from Kantronics for $34.95. This price includes a well-documented manual that introduces the SYSOP to a greater understanding of the use of and applications for the K-NET firmware.

For more information about the KPC-9612 and the K-NET contact Kantronics, 1202 E. 23rd Street, Lawrence, Kansas 66046 (phone 913-842-7745; fax 913-842-2021; service/tech line 913-842-4476; BBS 913-842-4678).

Credits and Kudos

Some of the material in this month's column was taken from the much larger Kantronics K-NET manual and is provided with permission of the Kantronics company.

I wish to express my sincere thanks to Phil Anderson, WØXI; Ken Johnson, WDØEMR; and Karl Medcalf, WK5M, for their help in putting together this month's column.

With the node philosophy now contained in a full-featured packet controller that enables simultaneous performance as a TheNET/X-1J and NET/ROM* compatible node, another milestone has been set in the evolution of packet radio. Now we are *really* having more fun packeting!

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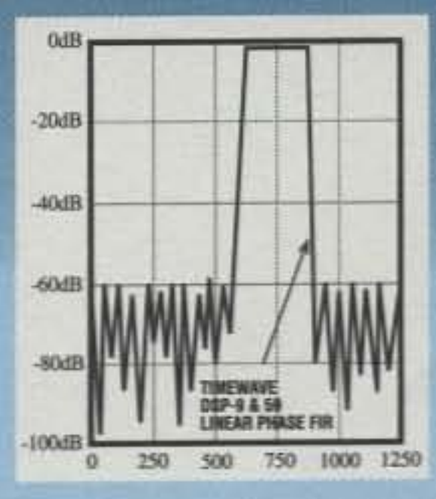

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DX

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NEWS OF COMMUNICATION AROUND THE WORLD

North Korea

Martti Laine, OH2BH, announced from Vladivostok, Russia that the first authorized amateur radio operation took place from North Korea on May 14 under the callsign **P5/OH2AM.**

The Finnish business delegation—including OH2BC, OH2BH, and OHØXX—experienced difficulties with Russian border guards while trying to enter North Korea (DPRK). The delegation was held for 26 hours awaiting clearance. During that time they activated RØ/OHØXX from the border region.

Once in the Democratic People's Republic of Korea (DPRK), they report they were warmly hosted by government and telecom officials. During their 17-hour stay they were part of a series of business activities and their on-the-air time was limited. Some 20 QSOs were made on two occasions (14 MHz SSB and 7 MHz CW).

The group presented four Yaesu HF/VHF transceivers for training purposes, and for actual amateur radio activity, which is now scheduled for later this year.

The DPRK Telecom delegation will be participating in the first Beijing DX Convention this October. While there, they will observe amateur radio in action at BY1PK and will meet with CRSA officials, including IARU Liaison Mr. Chen Ping, BZ1HAM.

Full documentation of the recent **P5/OH2AM** operation has been submitted to the ARRL, and the addition of North Korea to the DXCC Countries List is expected accordingly. This is quite an historic occasion, as North Korea will complete the list of countries by reason of government; it's the last of the United Nations member countries to be added.

Two members of the recent P5 activity—OHØXX and OH2BH—have now received another invitation for a full-scale amateur radio activation using the respective calls **P51XX** and **P51BH**. This second P5 activity is scheduled to follow their trips home to Finland and the completion of data collection, QSLing, documentation, and other post-operation tasks related to their recent BS7H operation from Scarborough Reef. OHØXX and OH2BH both worked closely with the Chinese Radio Sports Association to provide the logistics and transportation support necessary for the Scarborough Reef DXpedition. Martti Laine, OH2BH/VR2BH, based in Hong Kong, and Olli Rissanen, OHØXX/DX1EA, based in Manila, are both executives of a leading European telecommunications company providing telecommunications infrastructure on a global basis. In the course of their business travels throughout Asia, they have established good relations with the telecommunications authorities of the region. Both are avid members of the South China Sea DX Team, an alliance of Nokia Corp. employees promoting international goodwill through DX in the South China Sea region.

North Korea has been "pre-approved" for

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The first authorized amateur radio operation took place from North Korea on May 14 under the callsign P5/OH2AM.

Say You Saw It In CQ

The WPX Program

SSB

2513 .....DL4HAR 2515 .....JN6MIC
2514 .....JA9BLD 2516 .....BV5BG

CW

2872 .....YU1KJ 2875 .....DL3BZZ
2873 .....KW8J 2876 .....OH7MKR
2874 .....K3WWP

MIXED

1703 .....CT1KT 1705 .....DL3ANK
1704.....N1KCE

Mixed: 450 CT1KT, N1KCE. 500 CT1KT, N1KCE. 550 CT1KT, N1KCE. 600 CT1KT, N1KCE. 650 CT1KT. 700 CT1KT, W2EZ. 750 CT1KT, W2EZ. 800 CT1KT. 1100 I5AFC, WA3GNW. 1150 OE1-0140. 1200 OE1-0140. 1300 CT1EEB. 1350 CT1EEB. 1400 CT1EEB. 1450 CT1EEB. 1500 CT1EEB. 1550 CT1EEB. 1800 IN3NJB, VE9RJ. 2600 WB2YQH.

SSB: 350 F-11556, DL4HAR, BV5BG. 400 DL4HAR, IKØQDD, BV5BG. 450 DL4HAR, IKØQDD, BV5BG. 500 DL4HAR, IKØQDD, BV5BG. 550 IKØQDD, N1KCE. 600 IKØQDD, N1KCE. 650 IKØQDD. 900 IKØAPR. 1050 IV3VCG. 1100 I5AFC. 1300 CT1EEB. 1350 CT1EEB. 1400 CT1EEB. 1450 CT1EEB. 1500 CT1EEB, N2AC. 1550 CT1EEB. 1900 KF7RU.

CW: 350 K3WWP, DL3BZZ. 400 K3WWP, DL3BZZ. 450 DL3BZZ. 500 DL3BZZ. 1000 G3JTO. 1550 VE1MF. 1600 VE1MF. 1650 VE1MF, VR2UW. 1700 VE1MF. VE9RJ. 2600 N2AC. 3800 WA2HZR.

10 Meters: IN3NJB, HB9BHY
15 Meters: KF7JF
40 Meters: I8IKCI
160 Meters: OH2-612

Asia: JN6MIC, KF7JF, HA9PP
Africa: IN3NJB, HA9PP
No. Amer.: KF7JF
So. Amer.: IN3NJB
Europe: KF7JF
Oceania: IN3NJB, HA9PP

Award of Excellence Plaque Holders: I8YRK, W4CRW, SMØAJU, K5UR, K6XP, N5TV, K2VV, VE3XN, W6OUL, DL1MD, DJ7CX, DL3RK, WB4SIJ, SM6DHU, N4KE, I2UIY, DL7AA, ON4QX, WA8YTM, YU2DX, OK3EA, I4EAT, OK1MP, N4NO, ZL3GQ, VK9NS, DEØDXM, DK4SY, UR2QD, AB9O, FM5WD, I2DMK, W4BQY, IØJX, SM6CST, VE1NG, I1JQJ, WA1JMP, PY2DBU, HI8LC, KA5W, KØJN, W4VQ, KF2O, K3UA, HA8XX, HA8UB, W8CNL, K7LJ, W1JR, F9RM, W5UR, WB8ZRL, SM3EVR, CT1FL, K2SHZ, UP1BZZ, W8RSW, WA4QMQ, EA7OH, K2POF, DJ4XA, IT9TQH, W8ILC, K2POA, N6JV, W2HG, ONL-4003, VE7DP, K9BG, W5AWT, KBØG, HB9CSA, F6BVB, W1BWS, YU7SF, G4BUE, N3ED, DF1SD, K7CU, I1POR, LU3YL/W4, NN4Q, KA3A, YBØTK, VE7WJ, VE7IG, K9QRF, YU2NA, N2AC, W4UW, NXØI, W9NUF, N4NX, SMØDJZ, DK5AD, WB4RUA, DK5AD, WD9IIC, W3ARK, I6DQE, LA7JO, VK4SS, K6JG, I1EEW, I8RFD, I3CRW, VEFXR, N4MM, KC7EM, ZS6BCR, CT1YH, IV3PVD, KA5RNH, ZP5JCY, F1HWB, KC8PG, NE4F, VE3MS, K9LJN, ZS6EZ, YU2AA, I1WXY, IK2ILH, DEØDAQ, LU1DOW, N1IR, IK4GME, WX3N, KC6X, N6IBP, W5ODD, IØRIZ, I2MQP, I5ZJK, JAØSU, S51NU, K9XR, WØULU, HB9DDZ, F6HMJ, I2EOW, IK2MRZ, KS4S, KA1CLV, WZ1R, CT4UW, KØIFL, IN3NJB, WT3W.

Award of Excellence Plaque Holders with 160 Meter Endorsement: CT1YH, IV3PVE, KA5RNH, ZP5JCY, AB9O, FM5WD, SMØDJZ, DK5AD, SM6CST, I1JQJ, PY2DBU, W3ARK, HI8LC, KA5W, UR2QD, VE3XN, K6XP, LA7JO, W4VQ, K6JG, K3UA, HA8UB, W4CRW, N4MM, K7LJ, SMØAJU, KF2O, SM3EVR, K5UR, UP1BZZ, OK1MP, N5TV, K2POF, W8CNL, DJ4XA, IT9TQH, DL9RK, N6JV, ONL-4003, W1JR, W6OUL, W5AWT, KBØG, F6BVB, W4BQY, YU7SF, W5UR, N4NO, DF1SD, K7CU, I1POR, W8RSW, N4KE, I2UIY, YBØTK, W8ILC, W1BWS, VE7WJ, K9QFR, NN4Q, W4UW, NXØI, G4BUE, LU3YL/W4, I4EAT, WB4RUA, VE7WJ, N4NX, DEØDXM, VE7IG, K9BG, I1EEW, AB9O, CT1YH, IV3PVD, KA5RNH, ZP5JCV, I2MQP, IØRIZ, W5ODD, WX3N, IK4GME, HA8XX, YU1AB, F6HMJ, HB9DDZ, K9XR, KØJN, ZS6EZ, JAØSU, I5ZJK, I2EOW, KS4S, KA1CLV, KØIFL, K9LJN, WT3W, IN3NJB.

Complete rules and application forms may be obtained by sending a business-size self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to: "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101-9511 USA.

addition to the DXCC Countries List, as was the case with Peter I Island prior to the first accredited operation. North Korea is an obvious addition to the DXCC list, as it is very clearly a country by reason of government, under Point 1 of the DXCC country criteria.

The Korean peninsula was a Japanese colony for most of the first half of this century. Japan formally annexed Korea in 1910, but had controlled the country for the previous 15 years. When Japan surrendered at the end of WW II, 50 years ago, the Korean peninsula was divided at the 38th parallel between the occupying forces of the USSR and the US. United Nations attempts to unify the divided country failed, and in 1948 the Republic of Korea (what we call South Korea) was established. The Democratic People's Republic of Korea (North Korea) was established a month later. The Korean War, still under a state of cease-fire, failed to resolve which government was the legitimate ruler of the peninsula.

Since its founding, North Korea has been under the iron fist of Marshall Kim Il Sung, and more recently his son, Kim Jong Il. The Communist country is almost completely socialized and suffers from trade and budget deficits and food shortages. North and South Korea finally abandoned demands that each was the only true government of the peninsula in 1991, and both countries were then admitted to the UN.

At this point, separate DXCC status for North Korea by reason of government was obvious. A formal petition for same from some Northern California DXers was subsequently approved. North Korea awaited only an accredited operation to be added to the DXCC countries list.

Romeo Stepanenko, 3W3RR, announced plans to operate from North Korea and came on the air as **P5RS7**. However, detailed analysis of his accreditation documentation revealed that this operation actually took place in the part of eastern Russia that borders North Korea. The DXCC desk declined this operation for DXCC credit. Thus, North Korea retained its status as a "pending" country.

The recent operation by Martti Laine will probably result in North Korea being added to the DXCC countries list. With a mere 20 contacts, most DXers will then be one country away from having worked them all. More importantly, the DXCC Honor Roll cutoff will rise by one, from 317 to 318, as the number of current countries increases to 327 (or maybe more, depending on possible DXCC country status for Scarborough Reef and Pratas Island).

Martti Laine will certainly accept the DPRK invitation to return to North Korea, and provide a realistic opportunity for DXers to work, and confirm, the new DXCC country. This operation may happen as early as next month. Watch the timely DX news sources, such as *The DX Bulletin,* for details.

Follow-Ups

Following up on the discussion last month about minimum-size rules and Scarborough Reef, the DXCC Desk announced on May 9 that

ANTENNA OPTIMIZERS

AO 6.5 automatically optimizes antenna designs for best gain, pattern, impedance, SWR, and resonance. AO optimizes cubical quads, phased arrays, interlaced Yagis, or any other arrangement of wire or tubing. AO uses an enhanced, corrected MININEC algorithm for improved accuracy and assembly language for high speed. AO features 3-D radiation patterns, 3-D geometry and wire-current displays, 2-D polar and rectangular plots with overlays, automatic wire segmentation, automatic frequency sweep, symbolic dimensions, symbolic expressions, skin-effect modeling, current sources, polarization analysis, near-field analysis, and pop-up menus. *NEC/Wires 2.0* accurately models true earth losses, surface waves, and huge arrays with the Numerical Electromagnetics Code. Analyze elevated radials, Beverages, delta loops, wire beams, giant quads, LPDAs, or entire antenna farms. *TA 1.0* plots elevation patterns for HF antennas over irregular terrain. TA accounts for hills, valleys, slopes, diffraction, shadowing, focussing, compound ground reflection, and finite ground constants. Use TA to optimize antenna height and siting for your particular QTH.

YO 6.5 automatically optimizes monoband Yagi designs for maximum forward gain, best pattern, minimum SWR, and adequate impedance. YO models stacked Yagis, dual driven elements, tapered elements, mounting brackets, matching networks, skin effect, ground reflection, and construction tolerances. YO optimizes Yagis with up to 50 elements from HF to microwave. YO uses assembly language and runs hundreds of times faster than NEC or MININEC. YO is calibrated to NEC for high accuracy and has been extensively validated against real antennas. YO is highly graphical, mouse-enabled, and easy to use. *NEC/Yagis 2.5* provides reference-accuracy Yagi analysis and easy modeling of arrays of Yagis. Use *YO* and *NEC/Yagis* to optimize large EME arrays.

Any one program, $60; three, $120; five, $200. 386+387 and VGA required. Visa, MasterCard, Discover, check, cash, or MO. Add $5 overseas.

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CIRCLE 50 ON READER SERVICE CARD

Al Friedman, K6YRA, managed to catch SU2MT on 75 meters for his 200th band-zone for 5-Band WAZ, certainly the most difficult award to earn from the West Coast.

Pirro Calvi, IK2BHX, is a physician working for the International Red Cross, and is currently active from Azerbaijan 4J0/. He shows excellent taste in his reading matter.

the recently adopted DXCC minimum-size rule went into effect on April 20, 1995, when it was publicly announced by the ARRL Awards Committee. The rule will apply only to country petitions received by the DXAC on or after that date.

The petition for Scarborough Reef was in the hands of the DXAC before April 20. For that reason, the rule will not be applied by the DXAC in its deliberations and voting on the Scarborough petition.

In another follow-up on a previous column, Bob Schenck, N2OO, provides additional information about the **1S1DX** Spratly Island operation. First, John Ackley ex-KV4KV (now KP2A) was an additional operator on the original trip to Amboyna Cay. Further, "After being fired upon at Amboyna Cay, we decided to return to Brunei to do some further research and, if at all possible, try to find another island to operate from. N4WW had a work schedule conflict and could not stay for the longer anticipated time frame. N2OO and KP2A decided to remain in Brunei to maintain regularly scheduled communications with the Banyandah during their second trip. This sort of communications was *sorely* missed during the first trip. In the meanwhile we could attempt to salvage the overall operation by putting VS5 on the air. (NCDXF had advanced the group about $15,000, Yaesu loaned us equipment, and Hy-Gain donated antennas.) We were faced with the very real possibility that we may not have very much to show for all their generosity. At that time Brunei was a reasonably rare country and we had licenses. VS5OO made over 10,000 QSOs and VS5KV made about 5,000 QSOs. The other team members squeezed in a couple thousand QSOs before the first boat ride, so about 17,000 QSOs were made from VS5 and about 17,000 QSOs were made from 1S1DX by K4SMX, K1MM, and VK2BJL."

New callsigns for Alaska, Hawaii, and Puerto Rico: *The ARRL Letter* reports that the

The WAZ Program

Single Band WAZ

10 Meter SSB

483.....WP4U

15 Meter SSB

476.....WBØTVY
477.....F5OHS
478.....KC7V

17 Meter SSB

9.....DJ9ZB

20 Meter SSB

967.....WBØTVY
968.....PT7CB
969.....KD9WK

80 Meter SSB

66.....VE7DX

10 Meter CW

148.....IK3QAR

15 Meter CW

261.....JA1AS

20 Meter CW

459.....VE6JO
460.....JA1AS
461.....WO2N

80 Meter CW

45.....JE7MQB
46.....JA1PMN

All Phone

623.....WO2N

All CW

69.....KJ6HO
70.....I7ALE
71.....K2AZ

RTTY

42 20M RTTY.....JA1BWA

All Band WAZ SSB

4268.....KM6CB
4269.....IK7PUD
4270.....GM4VWV
4271.....VK6APW
4272.....W6UPI
4273.....KD9WK
4274.....WO2N
4275.....W5EU
4276.....WZ3E

CW/Phone

7571.....K8MBH
7572.....YU1KJ
7573.....IK1PQT (CW)
7574.....NQ6N (CW)
7575.....N5CBR
7576.....JM2DRM
7577.....WAØGOZ
7578.....JG3HQI (CW)
7579.....JR2KJJ
7580.....K6HMS (CW)
7581.....HA5AF (CW)
7582.....SM3KOR
7583.....KD9WK
7584.....KM6HB
7585.....IK1GPK (CW)
7586.....UT3UY

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

5 Band WAZ

As of April 30, 1995, 416 stations have attained the 200 Zone level.

New recipients of 5 Band WAZ Award with all 200 Zones confirmed:

LY2BR
W5EU

The top contenders for 5 Band WAZ (zones needed, 80 meters):

N4WW, 199 (26)
K6YRA, 199 (34)
AA4KT, 199 (26)
K7UR, 199 (34)
NAØY, 199 (26)
WØPGI, 199 (26)
W2YY, 199 (26)
W9WAQ, 199 (26)
W1JR, 199 (23)
VE7AHA, 199 (34)
W1FZ, 199 (26)
IK2GNW, 199 (1)
W9CH, 199 (26)
ACØM, 199 (34)
IK8BQE, 199 (31)
JA2IVK,199(34,40m)
KA5W, 199 (26)
K1ST, 199 (26)
ABØP, 199 (23)
VE1AST, 199 (18)
K2ENT, 199 (28)
KL7Y, 199 (34)
SM6AHS, 198 (12, 31)
UA3AGW, 198 (1, 12)
VO1FB, 198 (19, 27)
EA5BCK, 198 (27, 39)
KZ4V, 198 (22, 26)
K4PI, 198 (23, 26)
G3KDB, 198 (1, 12)
DK2GZ, 198 (1, 24)
UY5XE, 198 (24, 27)
N5FG,198 (22,34 on 40)
KG9N, 198 (18, 22)
KM2P, 198 (22, 26)
I1ZXT, 198 (1, 1 on 40)
GM3YOR, 198 (12, 31)
OE6MKG, 198 (12, 31)

The following have qualified for the basic 5 Band WAZ Award:

SP1JRM, 195 Zones
I1ZXT, 198 Zones
WBØTVY, 174 Zones
WO2N, 160 Zones
K5HT, 177 Zones
W5EU, 200 Zones

Endorsements:

WB6OKK, 197Zones
K9ZO, 192 Zones
GM3YOR, 198 Zones
KØVZR, 193 Zones
LY2BR, 200 Zones
OE6MKG, 198 Zones
HA5NK, 183 Zones
NT5C, 190 Zones

963 Stations have attained the 150 Zone level as of April 30, 1995.

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Manager, Jim Dionne, K1MEM, 31 DeMarco Road, Sudbury, MA 01776. The processing fee for all *CQ* awards is $4.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $10.00 for nonsubscribers. Please make all checks payable to the Award Manager. Applicants sending QSL cards to a CQ checkpoint or the Award Manager must include return postage. Questions regarding the WAZ Award may be sent to K1MEM with an SASE.

FCC has gone along with a 1993 ARRL request to provide additional callsigns for amateurs in Alaska, Hawaii, and Puerto Rico. Alaskan amateurs will be able to get *any* AL, KL, NL, or WL call, not just those with the numeral 7. (KL9KAA–KL9KHZ are reserved for US personnel in Korea.) Hawaiian amateurs will get AH7, KH7, NH7, and WH7, with Kure Island being noted by a K in the first letter of the suffix. Puerto Rico amateurs gain use of KP3, NP3, and WP3 prefixes. These callsigns may be used immediately, and several were activated in the WPX CW contest at the end of May.

DX Conventions

The 1995 New Orleans International DX Convention is Aug. 25–26 at the Royal Sonesta Hotel, on Bourbon Street, in the French Quarter of New Orleans. The program includes presentations on DXpeditions to Belize, Thailand, Ghana, Conway Reef, and South Georgia Islands, as well as many other antenna and DX-related topics. Registration prior to August 7 is $50 (late registration is $60). Send your regis-

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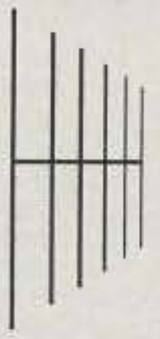

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The WPX Honor Roll

The WPX Honor Roll is based on the current confirmed prefixes which are submitted by separate application in strict conformance with CQ Master Prefix List. Scores are based on the current prefix total regardless of an operator's all-time count. Honor Roll must be up-dated annually by addition to, or confirmation of, present total. If no up-date, file will be made inactive. Lifetime Honor Roll fee is $4.00 (U.S.) for each mode, with no fee for additions.

MIXED

4676 9A2AA	3186 N4MM	2806 HA8XX	2458 S50A	2047 N2AIF	1812 KA5TQF	1445 AE5B	1289 HP2CWB	1040 N4PYD
4589 F9RM	3144 I2UIY	2783 IT9QDS	2441 I2MQP	2037 W6OUL	1808 HA8QC	1437 KØIFL	1285 WØIZV	994 VE6BMX
4312 K2VV	3106 W1BWS	2725 K9BG	2405 WB2YQH	1996 KS4S	1744 VE9RJ	1397 EA3CWK	1280 WK3Z	983 WU1F
3701 EA2IA	3095 N4UU	2711 HAØDU	2404 S53EO	1994 K2OLG	1674 PY2DBU	1376 KC6X	1277 K9BQL	977 WB2PCF
3494 W2FXA	3088 KA5W	2701 SM7TV	2354 K8LJG	1989 KBØG	1663 WB3DNA	1368 JN3SAC	1247 I1ZQD	889 VE3OMM
3480 K6JG	3050 YU1AB	2693 K9AGB	2230 K5UR	1928 WE2L	1650 CT1QF	1359 ND3A	1167 OZ1ACB	824 JR3TOE
3417 VE3XN	3046 I1EEW	2634 N2AC	2221 HA5NK	1907 NV9S	1625 HA9PP	1326 WA3HUP	1130 G4SDJ	796 OZ-2044
3353 N6JV	3028 9A2NA	2625 KF2O	2176 S51NU	1893 W9IL	1611 LU8DY	1323 W9IAL	1130 WT3W	786 W2EZ
3344 W1BWS	3017 WA8YTM	2549 HAØHW	2157 W4UW	1887 S58MU	1601 IØAOF	1320 KSØZ	1082 IK2DUW	761 EA2BNU
3342 N4NO	2920 W9DWQ	2502 I2EOW	2125 DK5AD	1870 SM6CST	1537 YBØTK	1317 NH6T	1078 IT9JPK	743 VE6JAV
3226 N9AF	2909 PAØSNG	2480 K2POF	2078 W8UMR	1858 W3KH	1502 WZ1R	1311 CT1EEB	1057 HB9DDZ	680 EA5FV
3214 I2PJA	2849 YU7BCD	2463 4N7ZZ	2052 IK2ILH	1853 G4OBK	1491 I2EAY	1301 I1-50156	1041 AA7FL	671 KB5OHT
3194 SM3EVR	2810 YU7SF							

SSB

4524 F9RM	2651 OZ5EV	2360 WA8YTM	1991 EA2AOM	1650 WA6SLO	1408 CT1BWW	1255 K8MDU	1049 KB4HU	893 SV3AQR
4085 IØZV	2644 I6ZJC	2272 LU8ESU	1984 K5RPC	1648 N6FX	1404 W6OUL	1253 G4OBK	1045 WA2FKF	844 S51NU
3688 K2VV	2626 I4CSP	2252 KF2O	1984 N4UU	1630 W5AWT	1390 AE5B	1200 T30JH	1034 W4PYD	841 I6KYL
3596 VE1YX	2623 NJØC	2250 EA3AQC	1980 EA5AT	1616 K8LJG	1385 EA5OL	1162 HP2CWB	1030 AA6BB	828 EA5DCL
3512 ZL3NS	2601 N4NO	2215 YU7BCD	1963 W4UW	1613 YU7SF	1368 DK5WQ	1160 EA5GKE	1030 NH6T	818 EA8BWW
3245 K6JG	2598 I1EEW	2193 WA4QMQ	1936 CX6BZ	1563 IK2DUU	1362 K3IXD	1147 K9BQL	1021 KØIFL	799 EA3EQT
3208 I2PJA	2590 KA5W	2191 I2EOW	1907 KF7RU	1538 KS4S	1339 IKØEIM	1127 EA3KB	1008 ND3A	783 CE5FSB
3137 WD8MGQ	2581 PAØSNG	2183 WF4V	1902 K5UR	1532 KA5TQF	1339 OE2EGL	1105 KBØG	1007 IT9JPK	778 JR3TOE
2967 CT4NH	2524 HA8XX	2168 CT4UW	1863 IN3QCI	1492 N2AIF	1314 CT1EEB	1101 EA1KK	976 EA8BGY	714 KE4BM
2825 N4MM	2472 I4ZSQ	2147 W9DWQ	1860 CT1BY	1484 K2EEK	1296 I1-21171	1089 WB6SRK	934 WT3W	680 N3DRO
2761 EA2IA	2397 I5ZJK	2122 PY4OY	1809 K2POF	1459 CT1DIZ	1296 IK2AEQ	1086 KC6X	926 DF7HX	658 VE9RJ
2716 EA8AKN	2395 9A2NA	2107 CT1AHU	1802 WE2L	1459 N2AC	1280 HA5NK	1083 EA1IF	916 EA1AX	611 IK4HPU
2703 I2UIY	2380 I2MQP	2047 4X6DK	1689 LU8DY	1415 KBØC	1277 HP6AYV	1071 WZ1R	916 WU1F	601 KJ8F
2675 F2VX								

CW

3740 K2VV	2411 N2AC	2029 S51NR	1826 W5AWT	1666 ZS6EZ	1419 KS4S	1186 KA1CLV	925 ND3A	706 HB9DDZ
3659 WA2HZR	2402 K9QVB	2018 W8IQ	1796 KF2O	1656 VE9RJ	1418 SM5DAC	1160 EA6AA	915 KC6X	704 I2EOW
3338 N6JV	2296 LZ1XL	1950 KA7T	1795 HA8XX	1625 N2AIF	1401 G4MVA	1100 OA3SM	873 I2MQP	676 HL5AP
3066 VE7CNE	2294 WA8YTM	1944 S51NU	1790 K5UR	1620 S58MU	1395 EA6BD	1081 WZ1R	857 PY4WS	664 KØIFL
2886 N4NO	2264 YU7BCD	1906 JA9CWJ	1755 N6FX	1612 I7PXV	1357 LU2YA	1041 4X6DK	848 NH6T	657 VE6BMX
2841 YU7LS	2259 KA5W	1870 K2POF	1754 OZ5UR	1526 W6OUL	1332 I2EAY	1035 AC5K	836 KL7UR	651 KF7JF
2728 N4UU	2253 G4UOL	1861 G3VQO	1746 SM6CST	1498 I1EEW	1257 EA7TG	1022 HI8LC	814 IK5TSS	602 WT3T
2726 EA2IA	2176 N4MM	1829 TI4SU	1730 W1WAI	1473 IK3GER	1237 EA7AAW	1011 W4UW	787 VE3OMM	602 KB5OHT
2691 K6JG	2109 I2UIY	1828 HA5NK	1692 VR2UW	1438 DJ1YH	1226 JN3SAC	1007 W9IAL	750 K2LUQ	
2573 YU7SF	2033 9A2NA	1827 K8LJC	1672 KBØG	1434 G4OBK	1200 IK2ECP	967 KA5TQF	715 EA2BNU	

Ricardo, HP2CTM, José, HP2CWB, and Emilio, HP2DFU, operated as HP9I from Iguana Island, a New One for Islands On The Air. (Thanks to W9DC for the photo.)

tration to Michael Mayer, W5ZPA, 5836 Marcia Ave., New Orleans, LA 70124. Daytime phone is 504-283-4143; fax is 504-524-2129. Make your hotel reservations directly with the hotel by calling 504-586-0300. Mention the convention to get the special room rate. The rooms are selling fast, so make your reservations soon. This is an excellent convention in a fine facility, and well worth attending.

The 1995 W9DXCC Convention is Saturday, September 9, in Rolling Meadows, Illinois, northwest of Chicago. Activities begin Friday evening with a hospitality suite sponsored by the Northern Illinois DX Association, and continue until Sunday morning. The banquet speaker is Garry Shapiro, NI6T, talking about the recent Conway Reef DXpedition. Other topics include DXCC/DXAC reports, J6DX, WØAIH's contest station, V59T, Scarborough Reef, and much more. Further information is available from Chairman Michael Zeug, K9EC, 9N317 Corron Road, Elgin, IL 60123.

The Association of Radio Amateurs of the Republic of Mexico (ARARM) invites amateurs to its 35th annual convention in Guadalajara, Mexico, July 27-30. The site is the Hotel Malibu, with rooms available for about US$36. It includes a DX forum. Additional information is available from Sergio Valdes Sada, XE2RJ, 011-52-83-357113 or 011-52-83-353368.

The 1995 Radio Society of Great Britain's International HF Convention is Sept. 9–10, at the Beaumont Conference near Heathrow

CQ DX Awards Program

SSB

2140 .....LU3OJZ 2141 .....N9KAE

CW

922 .....W1FYI

RTTY

22 .....W1FYI

SSB Endorsements

320 .....W6BCQ/326
320 .....LA7JO/326
320 .....VE7DX/326
320 .....K8CSG/325
320 .....KD5ZM/324
310 .....VE2GHZ/319
310 .....NI5D/314
300 .....WA2FKF/308
275 .....N9KAE/281
275 .....KK4TR/280
275 .....WZ3E/279
200 .....N5WYR/201
150 .....KB5CSQ/190
150 .....LU3OJZ/166
28 MHz LU3OJZ
28 MHz N9KAE

CW Endorsements

320 .....N7RO/324
320 .....K9IW/326
310 .....K9DDO/312
310 .....VE7DX/310
300 .....N5HB/304
300 .....W6YQ/301
275 .....LA7JO/289
275 .....KE5PO/286
275 .....W4UW/275

RTTY Endorsements

250 .....K3UA/271 250 .....KE5PO/254

Total number of active countries is 326. The basic award fee for subscribers to *CQ* is $4. For non-subscribers, it is $10. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00. Updates not involving the issuance of a sticker are made free when an SASE is enclosed for confirmation of total. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10 envelope, self-addressed and stamped, to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. DX stations must include extra postage for airmail reply. Please make all checks payable to the awards manager.

Airport outside of London. In addition to the usual DXpedition and IOTA program, they will have a station available to work the WAE contest that weekend. For more information, send a self-addressed envelope to Marcia Brimson, RSGB HQ, Lambda House, Cranborne Road, Potters Bar, Hertfordshire, EN6 3JE, UK.

Special Events And DXpeditions

The lengthy callsign of **VI5PEACE** marks the 50th anniversary of the end of WW II, Aug. 1 to Oct. 31. Try 1820, 3615, 7058, 10150(!), 14215, 18120, 21195, 24945, and 28580 kHz on SSB and the usual CW frequencies. QSLs are available for airmail SASE or SAE and one IRC, or an award is available for US$5 and airmail postage, from the Hervey Bay Amateur Radio Club, Inc., P.O. Box 829, Queensland 4655, Australia.

The Old Barney Amateur Radio Club operates **W2OB** from the Barnegat Lighthouse 1200–2300Z Aug. 5 & 6, on 7040 and 14040 kHz on CW, and 7250, 14280, 21380, and 28380 kHz on SSB. QSL with SASE for QSL only, or 9 x 12 SASE with two units of postage for QSL card and certificate, to Joe Fleishinger, NU2F, 75 Joshua Dr., Manahawkin, NJ 08050.

7S6AG marks the fifth IAAF World Cham-

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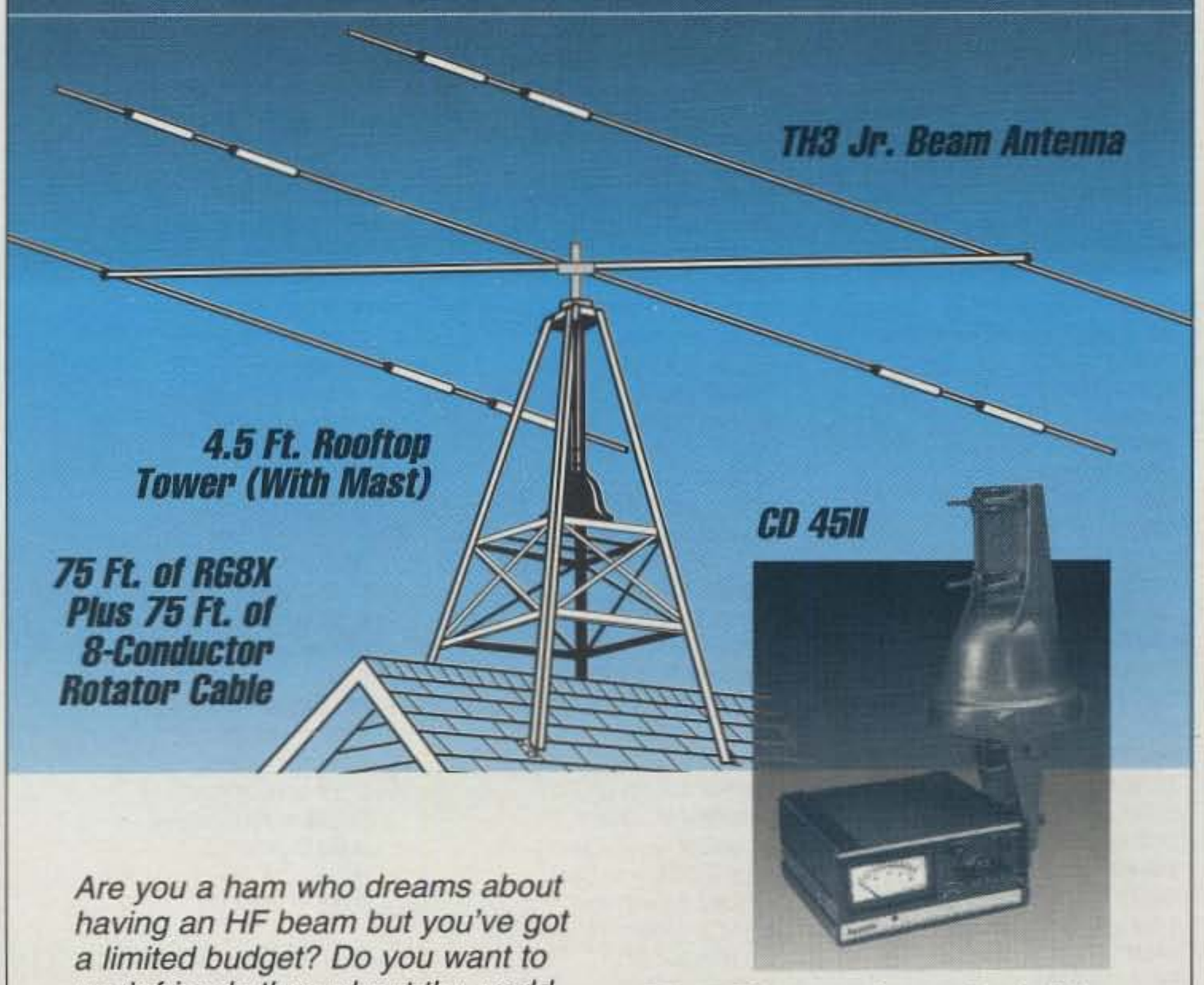

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3G1X to CE1IDM
3XYØA to YU1FW
4J3M to UD6DJ
4K9W to DL6KVA
4LØG to RF6FM
4L1AA to CT1CJJ
4L5O to CT1CJJ
4N7ØAL to YU7AL
4N7ØDX to YU1DX
4N7DW to YU7BJ
4X6UO to WB3CQN
5NØ/DL9GMM to DL9GMM
5NØGC to F2YT
5N3ALE to DJ2VZ
5U7Y to JG3UPM
5WØBY to JA2FBY
5WØJA to JF2RZJ
5X1F to WB1DQC
6V1A to 6W6JX
7Q7LA to GØIAS
7Z1AB to KN4F
7Z1IS to OE6EEG
9K2MU to WA4JTK
9K2YAZ to N2YAZ
9K2ZC to KC4ELO
9K2ZZ to W8CNL
9M8BT to N5FTR
9V1YC to AA5BT
A22EX to N4CID
A35MW to VK2BEX
A35VI to K8VIR
A35XC to JE1DXC
BØØM to BV2KI
BZ5HAN to BZ5HZ
C53HG to W3HCW
CI9HF to VE1NH
CP4CR to IK2UVU
CS8EGW to CT1EGW
CY9CWI to VE2CWI
D3X to CT1EGH
EA8BYR to WA1ECA
EU1YL to UC3AB
EU7SA to RC2SA
EV1F to UC2AFC
EW1WZ to DL1OY
EW3LB to W3HNK
EXØA to DF8WS
EXØM to DF8WS
EXØV to DF8WS
EX8DX to F5OJO
EX8F to DL8FCU
EY8WW to DL8WN
FG5GZ to F6CLK
FK8FI to F6GZA
FK8GJ to F6CXJ
FK8GT to F6GZA
FP/KA1NCN to AA1AS
FR5ZU/T to VE2NW
FS5PL to FG5BG
FY5GJ to F2YT
H44/JA1OEM to JA1OEM
HBØ/DL1RNW to DL1RNW
HC8JG to WA6ZEF
HL9BS to N2BSA
HP1XXD to N4NFM(94CB)
HSØZBJ to W8GIO
I1A/ØSG1 to I1RBJ
IC8SDA to IK8CQH
IS1A/ØS1A to I1RBJ
IY4FGM to I4IKW
JW/DK8ZJ to DK8ZJ
JWØGB to LA8PF
JWØH to LA5NM
JWØI to SP3ASN
JW4LN to LA4LN
JY8FN to DK9FN
L3CW to LU6BEG
LX9UN to LX1NJ
OD5JY to OE6EEG
OHØ/OZ5IPA to OZ5AAH
OHØBDA to OH2BDA
OM5XX to OK3CQR
OM9SIAD to OM3CTA
OQ5ØUSA to ON4RAT
OX3GX to WA3KSN
P2ØVH to VK4CRR
P29VH to VK4CRR
P4ØMX to JR4PMX
PYØFF to W9VA
RØ/G3MHV to G3MHV
RØ/KA6ZYF to KA6ZYF
R1FJL to RA1OA
R3/G3MHV to G3MHV
R3/KA6ZYF to KA6ZYF
R9/G3MHV to G3MHV
R9/KA6ZYF to KA6ZYF
RAØA/K4EWG to K4EWG
RK1OWZ to WA7OBH
S21ZG to W4FRU
S61YC to AA5BT
SNØPR to SP6FER
SV/WY3V to WB2RQW
T31BA to DL2ZAD
T31BB to DF6FK
T32Z to N7YL
T92A to S57MX
T92X to KA9WON
T99W to DL1QQ
TA1/K4UEE to K4UEE
TM2H to F5JCG
TNØCW to DK7PE
TR8CA to F6CBC
TT8/F5IXR to F5MXH
TU2ZR to SM3DMP
TU4EI to W3HCW
U5WF/UR9P to SP5IUL
UAØQBA to UC2WP
UE9WML to KA6ZYF
UE9WTL to G3MHV
UN7R to UL7RE
US5WE/US8P to SP5IUL
UX4UA to DK1RV
V31RD to G4SMC
V47KEP to DL8WAA
V85BG to G3JKX
V85KX to G3JKX
VK6DX to AB4ZD
VP2EP to DL8WAA
VP2MR to N5DXD
VP2VE to WA2NHA
VP5/AB5MF to AB5MF
VP5JM to W3HNK
VP9MZ to WB2YQH
VQ9KC to AA7AN
VQ9TP to N5TP
VR2IH to G4RGK
XU7VK to HAØHW
XX9AS to KU9C
YI1DZ to WA4JTK
YP7ØØBV to YO6EZ
YS1DRF to W2PD
YS1XS to WD4PDZ
YW171LM to WS4E
Z21BA to N5FTR
Z31GX to YU5GBC
Z31PK to YU5XVD
Z37GBC to YU5GBC
ZA1AJ to OK2PSZ
ZA1J to I2MQP
ZL3KG to WB6EQX

pionship in Athletics Aug. 4–13. Try 15 kHz up on CW and 3750, 7050, 14250, 21250, and 28450 kHz on SSB. Work 7S6AG and two club members of the Gothenburg Radio Amateurs Club for an award. Fee is US$5 from Göteborgs Sändareamatörer, Box 1143, S-436 23 Askim, Sweden.

Ron, **AA4VK/CY9**, Murray, **WA4DAN/CY9**, Bob, **KW2P/CY9**, Vance, **W5IJU/CY9**, and Bill, **K4TVE/CY9**, will be active from St. Paul Island July 27 to Aug. 2, on all bands, 160–6 meters, including the amateur satellites. They will have Yagis on 40–10 meters, including two 40 meter Yagis. Major sponsors of the operation are Cushcraft Corp., Dunestar, and Radio Works Company. Donations and QSLs go to Murray Adams, 403 East 14th Street, Greenville, NC 27858.

QSL Notes

QSL the 1995 WPX CW operation of **ZF1A only** via W5ASP, *Callbook* address. Do **not** send cards via the ZF bureau.

QSL **5U7Y** via Takalyuki Yoshino, JG3UPM, 4-1-83 Uriwari-Higashi, Hirano-Ku, Osaka City, 547, Japan.

N6VI/KH7 in WPX CW was from **Hawaii**, *not* Kure. QSL to Marty Woll, N6VI, 59-758 Kanalani Place, Haleiwa, HI 96712.

Baldur, **DJ6SI**, now asks for an SASE for QSLs from *any* of his dozens of DXpeditions, dating back more than 30 years. This reverses his previous demands of funds and a six-month time deadline.

QSL Serge Zakhorutin, **UN7CM**, direct to him at P.O. Box 14, Petropavlovsk, 642032, Republic of Kazakhstan.

The new address of IOTA DXpeditioner Bernhard Stefan, **DL2GAC**, is Moeggenweiler Str. 18, 88677 Markdork, Germany. Cards sent to his previous address are being forwarded.

QSL **SV9/HAØHW/P, SV9/HAØHV/P, SV9/HGØD/P** and **SV9/HAØET/P** via HAØHW.

QSL the April 1994 operation of **7O1AA** via **registered mail** to Ahamed Nasser, HZ1FM, Box 7198, Jeddah, Saudi Arabia.

QSL **CS8B** (Murraceira Isl.) via WA1ECA, or Europeans may QSL direct or via the CT bureau to CT1EEB.

QSL **ZV2Q, PT2QX**, and **PT5W** via

JT1BR is one of the most active amateurs in Mongolia. (DJ9ZB photo.)

Ulyesses José S. Neto, PY5LY, P.O. Box 6058, Curitiba PR, 80011-970, Brazil.

QSL **9G5TL** via Jack Sheldon, KG7XC, P.O. Box 31898, Mesa, AZ 85275.

QSL the individual operators of the 1994 Ghana DXpedition via their home calls: **9G5JR** via WA7LNW; **9G5MB** via AA7NO; **9G5MT** via WY7K; **9G5RM** via NZ7E; **9G5VT** via K5VT; and **9G5WH** via KF7AY. Cards should not be sent to Ghana.

Crete SV9 amateurs have set up their own QSL bureau, separate from the regular SV bureau. Cards for SV9 amateurs may be sent via Radio Amateur Association of Crete, P.O. Box 1390, Gr 71110 Iraklion, Crete, Greece.

Francisco J. Monroy, **HK3MAE** says his *Callbook* address is wrong, and he is not a member of the LCRA, so he doesn't get cards via the bureau. QSL direct to him at P.O. Box 250369, Satafé de Bogotá, Colombia.

QSL the Perceveira Island operation of **CS4PV** to CT1EIF, via the CT bureau or direct to P.O. Box 23, 7860 Moura, Portugal.

QSL **C6AGH** via KA1DIG.

QSL the **BS7H** Scarborough Reef operation to Kan Mizoguchi, JA1BK, 5-3 Sakuragaoka 4 Chome, Tama-City, Tokyo 206, Japan, and *not* via JA1BK's *Callbook* address.

QSL **S92SS** to Charles Lewis, Box 522, São Tomé, West Africa (via Portugal). This address is also good for his wife Lesley, **S92YL,** and for Glenn Britt, **S92ZM**.

North American stations may QSL **US5MV** and **UB5MV** via Bob Reiser, AA1M, 6 Savin St., Burlington, MA 01803.

QSL **ZA1MH** via Z32KV, Box 10, Sturga 96330, Republic of Macedonia.

QSL **ZA1AJ** via OK2ZV (ex-OK2PSZ).

QSL **V31MD** via Bob Fox, V31MD, 207 Hawthorne Ave., Mill Valley, CA 94941.

QSL the Philippine callsign of **4F2IR** via DU3CO.

QSL **II9R**, active in the ARI Contest, via IT9HLR.

QSL UX2HO's special contest call of **EN2H** via I1PJA.

9L1PG has a new QSL manager: Cecil Williams, NW8F, 975 Kittle Road, Wheelersburg, OH 45694.

The new QSL route for Romeo Stepanenko's operations as **YAØRR, 1S1RR, 1SØXV, 9DØRR, XYØRR, 3W3RR, US8R, URØRR, USØRR**, and **EO7RR** is via Vladimir Stepanenko, US1RR, P.O. Box 28, Chernigrov Postamt, 250000 Ukraine.

QSL **UZ100XE** via UY5XE, and **EO50BA** via RB5BA.

73, Chod, VP2ML

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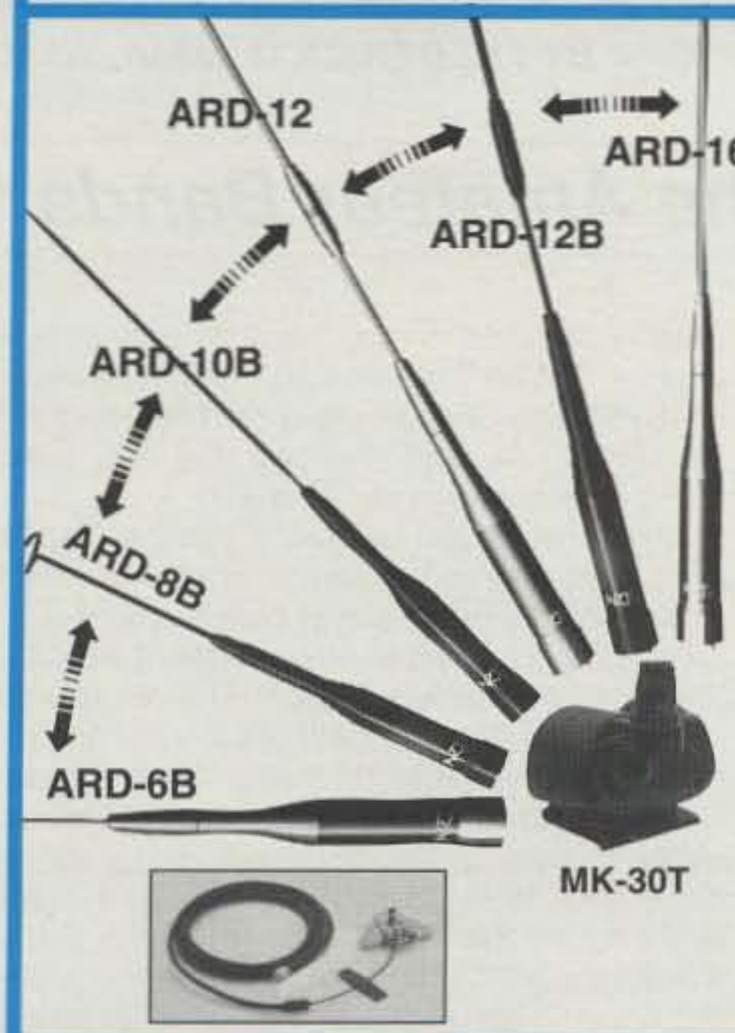

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ARD6/6B	26.5″	2m:2.6/70cm:4.9	100w
ARD10/10B	34.4″	2m:3.0/70cm:5.5	120w
ARD11/11B	41.5″	2m:3.7/70cm:6.1	120w
ARD12/12B	48.2″	2m:4.3/70cm:6.8	150w
ARD16/16B	64.8″	2m:5.0/70cm:7.7	150w

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WASHINGTON READOUT

REGULATORY NEWS IN THE WORLD OF AMATEUR RADIO

BY FREDERICK O. MAIA, W5YI

Information Bulletin Broadcasting on The Amateur Bands

We filed a Petition for Rulemaking this past spring in response to what amounts to international broadcasting on the amateur bands. Suggested was that the FCC consider transferring information bulletins—especially voice broadcasts—to the amateur bands above 30 MHz.

Among much misinformation, this petition immediately set off a furor in the amateur community. The American Radio Relay League immediately attacked the proposal on the basis that it would adversely impact W1AW. The ARRL also implied that the proposal was "self-serving." Although the ARRL indeed sells a newsletter and license preparation materials, W1AW provides some of these services free of charge. The public comment period of the proposal closed on May 4th.

Chaos on The HF bands

There can be no doubt that some amateur stations are taking advantage of the FCC rules which permit one-way bulletin broadcasts to the amateur community. The FCC's Part 97 rules, Section §97.111(b)(5) and (6), permit one-way information bulletins and telegraphy practice to be transmitted on all amateur service bands. Supposedly, however, only messages directed to amateur operators on "subject matter of direct interest to the amateur service" may be aired. Therein lies the problem.

What is happening is that amateur stations are conducting broadcast radio shows, editorializing for hours on end, playing taped recordings, and even preaching the *Bible* on the amateur bands. Based on W1AW's activity, these broadcasters are claiming exclusive use of the frequencies they employ. And like W1AW, at least one amateur broadcasts on virtually every HF band simultaneously for hours on end. Needless to say, this has led to much over-the-air hostility and retaliatory jamming. The ARRL is very much aware of the problem. Their view is that it is primarily an enforcement matter.

We have a thick file going back to 1987 in which the Bermuda Radio Society has consistently claimed 20 meter interference from a scheduled bulletin station (not W1AW) that "dumps a broadcast on the frequency (14.275 MHz) without either listening on the frequency or asking if the frequency is in use." The Bermuda Net has operated on 14.275 for more than a decade. In a May 4, 1988 letter to VP9HK, Glen Baxter, K1MAN, made the statement, "Our amateur broadcast practice is identical to that of W1AW."

ARRL's Dave Sumner, K1ZZ, responded to that allegation on May 13, 1988 by saying "*QST*, W1AW transmits simultaneously on eight frequencies in as many amateur bands. The bulletin transmitters are crystal-controlled, a limitation we hope will be remedied shortly. The number of frequencies being used simultaneously, and the technical limitations on the equipment now in use, make it impossible to adjust the transmitter frequencies before a bulletin is to be transmitted; the need to adhere to the published bulletin schedule precludes delaying the broadcasts until the frequency is clear."

Seven years later W1AW's transmitters are still crystal controlled. But W1AW is *not* the major problem. Their voice bulletins are short and transmitted only twice a day. It is other stations that are taking advantage of the rules under which W1AW operates. Bulletin stations generally believe that the FCC rules permit them to operate on a specific frequency for any length of time regardless of channel occupancy, especially if they publish a schedule beforehand.

They also believe that they are exempted from the rules that require a station to monitor a frequency prior to transmitting. In effect, bulletin stations are stating that the fixed frequencies they employ belong to them, which is contrary to the rules.

There is ample evidence that the transmitting duration of amateur "broadcast" stations is increasing and they are becoming a nuisance. Several amateurs have offered suggestions on how to deal with this problem. We included telegraphy practice in our proposal, since their mode of operation parallels that of voice bulletins. We agree, however, that the problem essentially exists on the HF telephony bands, and the FCC may wish to discontinue the rules which permit voice HF broadcasting.

The problem has reached monumental proportions lately. The ARRL even saw fit to include an "Op Ed" editorial entitled "The Invasion of Ugliness" in its April issue of *QST*. "The solution," it said, "is simple: Keep your anger off the air."

We became interested in the problem when one bulletin broadcaster, Glen Baxter, K1MAN, of Belgrade Lakes, Maine filed charges in January and February 1995 against the FCC and the ARRL for violating Section 501 of the 1934 Communications Act. This section provides for a $10,000 fine and one-year imprisonment for anyone who permits an illegal act or allows it to continue. Baxter cited the FCC for failure to stop the interference to his bulletin transmissions. On the other hand, amateurs engaged in on-going two-way communications accuse Baxter of interference. Back and forth it goes.

Georgia hams have been using 3.975 MHz for years for their two-way "2100 Gang" roundtable network—2100 meaning 9 PM in the evening. Some time ago the International Amateur Radio Network (IARN is headed up by Baxter) decided to start up a broadcast bulletin service on the same 80 meter frequency at 10 PM. The Georgia gang said they had the frequency first, and charged that they were being intentionally interfered with.

IARN responded by saying that they had a right to broadcast bulletins on 3.975 MHz, since they scheduled their bulletins similar to those of the American Radio Relay League's W1AW headquarters station. The result was anger on the airwaves with each side accusing the other of jamming their transmissions.

To counteract the "frequency in use" claim, IARN began a two-hour talk program in November 1994 starting at 8 PM. That effectively meant that Baxter and IARN got to the frequency first. The hostility intensified when the Georgia group began recruiting amateurs to start at 7:30 PM. Baxter said he tried to negotiate frequency use, but that the group would not consider a compromise. Matters got worse.

In January K1MAN began sending Felony Complaint Affidavits to the U.S. Attorney's Office in Bangor, Maine. He charged several amateurs with felony interference to his bulletin service and cited Section 333 and 501 of the Communications Act as the legal justification. Section 333 is a little-known one-sentence statute which states "No person shall willfully or maliciously interfere with or cause interference to any radio communications of any station licensed or authorized by or under this Act or operated by the United States Government." The U.S. Attorney said, however, that they do not handle interference cases and forwarded the complaints to the FCC.

In early February I (Fred Maia, W5YI) was asked to appear via phone patch on the Georgia Network to discuss amateur radio rulemaking. The subject got around to the broadcast of one-way bulletins and their impact on on-going communications. I said scheduled bulletins appeared legal under the rules but that the real problem was retaliatory malicious jamming due to interference with on-going communications. It is my belief that one-way scheduled bulletin broadcasting is not compatible with two-way leisure radio communications. My feeling is that there were many modern ways to distribute information bulletins without taking up valuable HF spectrum.

Petition for Rule Making Filed

During early March I discussed the one-way bulletin mess with my Washington, D.C. attorney, Ray Kowalski. Ray had served with the FCC for nearly two decades before entering private communications law practice. Among other things, his last FCC position as Special Services Division Chief involved supervising the Personal Radio Branch, which included the Amateur Service.

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Say You Saw It In CQ

A month later the proposal was filed with the Commission asking that one-way bulletins and code practice be limited to amateur frequencies above 30 MHz—i.e., in the 6 meter and shorter wavelength bands. It was never suggested (or intended) that any other one-way transmissions—such as beacons, telecommand, telemetry, and certain retransmissions—were included.

Our stated goals were clear: to alleviate the level of anger and retaliation present on the HF bands caused when one-way, broadcast-type transmissions interrupt two-way communications in progress. We also said we were concerned about the example this back and forth friction was presenting to new amateurs.

The FCC preliminarily accepted the petition as having merit, assigned it RM-8626, and issued a Public Notice establishing a comment period. Shortly thereafter the American Radio Relay League began a very aggressive campaign against the proposal. They wrongly reported in their Bulletin No. 34 and in their ARRL Letter that the petition would eliminate all one-way transmissions below 30 MHz. Not true!

The League also said the purpose of filing was to benefit W5YI's commercial enterprises and the "W5YI Petition Would Silence W1AW." No where in either report was there any acknowledgement of any problems being caused by bulletin stations.

Comments on The Petition

More than 200 comments were filed and most opposed the Petition on the grounds suggested by the League. Many contained little more than a testimonial to ARRL station W1AW. Few of these commenters proposed solutions to the broadcasting problem or had even apparently read or understood the objective of RM-8626.

It is more likely that they filed in reaction to the article in the ARRL Letter of April 3, 1995, and to ARLB No. 34, distributed April 5, 1995 from W1AW. In addition, an ARRL campaign was noted at the Dayton HamVention whereby amateurs were asked to sign preprinted comments opposing RM-8626 due to alleged impact on W1AW, but containing none of the substance of RM-8626.

The genuine purpose of the Petition is to reduce interference, and the amateur-against-amateur hatred being generated in the Amateur Service, by removing rules that some operators exploit for one-way broadcast-type transmission below 30 MHz.

The ARRL believes, "Maia, in the League's view, vastly overstates the level of concern about abuses of the Commission's existing rules governing one-way transmissions in the Amateur Service." In fact, that amateur broadcasting is a serious problem requiring prompt Commission attention is amply documented by numerous supportive commenters, including ARRL members, in the public record of this proceeding.

Don Simpson, KO4TA (Woodstock, GA), agreed that amateur broadcasting is a real problem. He complains of bulletin interference consisting of " . . . endless loop tape playing for over 48 hour periods" and notes that one amateur broadcaster recently " . . . has tripled his transmission times."

Charles M. Albert, Jr., KC6UFM (Fredericktown, MO), urged adoption of RM-8626. "The situation on the amateur bands below 30 MHz with many stations broadcasting information that meets the current rules has become intolerable. All of the stations that engage in broadcasting blatantly disregard the regulations and standards of good operating practice by failing to check the frequency for ongoing communications before transmitting and so create deliberate interference."

"All of the stations in question have stated a belief that the frequencies they use belong to them. This is in direct violation of regulations," Albert writes. "The state of the art has outpaced the need for things like Morse Code practice transmissions and announcement-type bulletins."

Jim Rinehart, WB9CEP (Indianapolis, IN), believes "We have enough interference from broadcast stations without adding amateurs who want to play International Broadcaster." He said, "It's not the '60s when W1AW bulletins were the only way to stay current with what was going on in amateur radio."

Jim Monahan, K1BNQ (Easton, CT), agreed that " . . . there is abuse by a few stations who transmit for extended periods of time in the name of information bulletins." He observed that there " . . . is a certain vagueness regarding exactly what constitutes a legal one-way transmission and what does not," and cited a 160 meter AM operation that " . . . trans-

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mits by the hour, with professional sounding announcers," and has apparently been doing so for a number of years.

"As new amateurs . . . hear these activities going on, it will only foster new stations operating in this manner," he wrote. "I also believe that there is the possibility that some of these stations may soon become 24 hours stations if this continues."

Monahan called for increased FCC enforcement, legitimizing only certain bulletin stations and limiting one way transmissions to 15 minutes and no more than once or twice a day.

Bennett Z. Kobb, KC5CW (Arlington, VA), points out the "fundamental incompatibility of broadcasts in the amateur bands with the basis and purpose of the Amateur Service." He cites "incessant one-way operations" that "emit filibusters, not 'messages' and therefore (are) not bona fide information bulletins."

Although FCC Rules do not allow amateurs to conduct broadcasting, Kobb contends that " . . . some amateurs through lengthy, repetitious voice transmissions on multiple frequencies transform their stations into de facto International Broadcast Stations. . . . Taken as a whole, the emission mode, scheduling, promotional, and programmatic format of the transmissions at issue, together with their near-continuous spectrum occupancy and apparently automated nature, ignorant of ongoing communications, identify them as 'a form' of broadcasting and thus prohibited by Section 97.113(c)."

Stephen T. Bentley, WD4ITY (Forsyth, GA), said he " . . . would prefer to see only the phone bulletins limited to frequencies above 30 MHz." He also warns that "If some sort of rule-making decisions are not made concerning one-way 'talk show' broadcasting, these types of stations will eventually proliferate the bands, making normal amateur communications as well as emergency communications very difficult."

Fred C. Adams, AC4UN (Inverness, FL), believes that " . . . if one-way communications are allowed to continue below 30 MHz on the amateur bands, then they should be limited to no more than 30 minutes, once every six hours. As it is now, any station . . . can play a tape continuously over and over for hours on end and keep a frequency tied up."

Sherwood D. Dudley, W4EWP (Lookout Mountain, TN), supports RM-8626. "K1MAN must have a grudge against the ARRL and the FCC regarding one-way broadcasting and bulletin services," he comments. "I hear him on 14.275 MHz and 3.975 MHz. He just starts broadcasting. He must never monitor the frequency or he would know a QSO was going on. If every ham would operate in this manner our ham bands would not exist."

James W. Drummond, N5YSO (Shawnee, OK), says, "Amateur radio operators . . . have made a mockery of the intentions of the ARRL, which is to inform and train new and old hams." He believes Baxter should apply for a commercial radio station if he wants to make his views known.

Robert S. Bennett, W3WCQ (Towson, MD), believes that RM-8626 " . . . addresses a problem of growing concern on the high-frequency bands assigned to the Amateur Service. Specifically, the growing number of 'news' bulletins and code practice transmissions cannot be justified in the limited spectrum available. Some of these transmissions unfortunately reflect personal vanity on the part of the operators, and are thinly veiled editorial broadcasts, rather than a true service to the Amateur community."

Don West, KF9OE (Sheridan, IN), comments, "I do not want to see stations permitted to broadcast for extended periods of time (more than an hour on the same frequency) in the amateur radio bands . . . "

Gerald R. Gavin, NU3D (Glen Burnie, MD), is " . . . in favor of curtailment of some one-way transmissions, since they appear to be strictly an ego trip. Often I have heard one station come on 20 meters and interrupt ongoing QSOs."

Nelson Large, W4FQV (Salisbury, NC), finds "no need or rationale for one-way or 'talk radio' type activity on the amateur frequencies below 30 MHz." He believes that if the activity is allowed to continue then " . . . one-way broadcasting should be restricted to the upper 3 MHz of the 160, 75, 40, and 20 meter amateur bands." He adds, "I hope there is a way to end, or to make acceptable, an activity that fosters ill-will and rudeness where there should be mutual tolerance and enjoyment for everyone involved."

Despite the claims of ARRL headquarters that the amateur broadcasting problem is overstated, ARRL members concluded differently. **Lawrence Macionski, WA2AJQ (Bluemont, VA),** said that he " . . . received correspondence from the ARRL to make written comment to OPPOSE this petition. It is the (ARRL) director's position to oppose it, even though they know the true intent of the petition. I must break ranks as a member because (of) the current

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situations on the HF bands in this regard. I believe the real purpose of this petition is to 'clean up' a downward spiral. That I must agree with." Macionski said that some activities on the HF bands are counterproductive and waste HF spectrum: "I agree with Fred Maia, and believe they should be removed from amateur bands below 30 MHz."

Mike Musick, NØQBF (Maryland Heights, MO), an ARRL Station Appointee and member of the FCC Amateur Auxiliary, believes that the " . . . prohibition of one-way bulletin transmissions should be extended to cover all amateur frequencies. There should be no exception for frequencies over 30 MHz." He agrees that HF bulletin stations " . . . engage in wide-area 'broadcasting' of bulletins only superficially related to the Amateur Radio Service, and for all intents, result in exclusive use of frequencies."

ARRL member **Thomas Clements III, W1ICH (Key West, FL),** favors adoption of RM-8626. He believes that "The information provided by HF broadcast transmission is readily available today via land-line or packet radio service without cluttering up the limited frequency spectrum in the HF bands. . . . We need to encourage courteous behavior in the amateur bands."

Clements observes, "Unilateral transmission of information without prior checking for a clear frequency is about the most intrusive and discourteous behavior possible."

Kenneth P. Elsberry, WD4ERM (Valdosta, GA), is a past president of an ARRL affiliated club. He says, "The Georgia Single Sideband Association and the Georgia ARES net has had its operations severely hampered with interference from a station making one-way broadcast transmissions on a regular scheduled basis of more than 100 times weekly. The broadcasts come on the air regardless of current frequency use and on several occasions during emergency conditions have severely disrupted communications."

"The content of these broadcasts consists of material that is recorded from other news services, editorial opinionated radio talk show excerpts, and political news of foreign government uprisings. . . . Much of this material is hardly of interest to amateur radio operators."

Elsberry continues, "There seems to be some myth that makes it okay for broadcast stations to run roughshod over existing users of a frequency simply because the broadcaster wants to maintain a schedule. Such operators of the so-called 'information bulletin stations' have made a nuisance of themselves and have virtually destroyed popular frequencies. . . . Broadcasters are abusing their licenses and causing turmoil on the frequencies. . . . How many broadcasters can the bands stand? Just how long can they occupy a frequency? What is to keep them from going 24 hours a day? . . . It is simply not feasible to allow broadcasters to waste frequency space and cause the hate and discontent that they are causing on the air."

Some amateurs believe rulemaking to resolve this situation is unnecessary. **Robert M. Beatty, WB4SON (West Warwick, RI),** states that "While one-way communications do, on occasion, cause interference to others operating on the same frequencies, these frequencies are well published and are well known throughout the amateur community. . . . [The] 'anger' is caused by the operators themselves who chose to become frustrated about the necessity to change frequency enough to avoid being interfered with."

In effect, Beatty suggests that mere publication or wide knowledge of amateur broadcast frequencies conveys to the broadcaster exclusive rights to the frequencies, to be avoided at all costs by other amateurs. Such a result impermissibly grants broadcasters de facto franchises to particular portions of the spectrum.

Beatty dismisses amateurs' anger that they must change frequency to avoid broadcasts, ignoring the clear responsibility incumbent upon the broadcaster to adjust frequency in order to avoid ongoing two-way amateur communication.

This argument would allow an amateur operator to simply transmit when and where desired, without consideration for others who must move to other frequencies if they wish to continue operating.

Leonard A. Schachter, N3RPQ (Washington, DC), opposes RM-8626. He suggests, "Individuals wishing to make non-commercial information bulletin or Morse code transmissions should arrange to meet in a coordinating committee of the type established to voluntarily control repeater operations. The issue should be resolved not by the Commission, but through a 'gentlemen's agreement' of the involved parties."

While we generally support voluntary efforts to reduce interference without Commission involvement, two points must be raised regarding Schachter's suggestion. First, RM-8626 concerns HF amateur operation which is nationwide and worldwide in nature, not local and statewide as in the case of repeater coordination. This vast scope of HF transmission necessitates uniform national policy.

Second, Schachter proposes no mechanism by which amateur broadcasters should be admitted to the "coordinating committee," how such a committee should be funded and managed, and what fate would await those who do not subscribe to its "gentlemen's agreement," among other questions.

The Commission cannot rely on such vague recommendations as a substitute for rulemaking. As **Robert E. Nelson, WD9HSE (Kerrville, TX),** states, "With over 300,000 General Class and above amateurs in the United States alone, there is no hope of coordinating an open voice frequency with every eligible licensee. The current broadcasting mess is not just a United States problem, it is international in scope."

Nelson further states that "Mr. Maia is correct. There is a very real problem with abuse of amateur radio bulletin broadcasting in the HF bands. . . . I believe that the real problem is voice bulletin broadcasting. . . . I am disappointed this problem was not dealt with before a request for rule making was submitted. This problem will fester until it is resolved."

"Current regulations allow any amateur radio operator with HF privileges to establish a world-wide broadcasting service. This is easier than the alternative route of attaining a broadcast license and setting up an expensive broadcast station. The requirement that broadcast content must be limited to material of interest to amateur radio operators makes virtually all material legal. I heard a bulletin broadcaster reporting on a local ice fishing tournament."

Alfred D. Crudele, Jr., N2HEP (New Windsor, NY), says, "that with an increasing number of radio enthusiasts joining the ranks of HF amateur radio operators and prime HF bands

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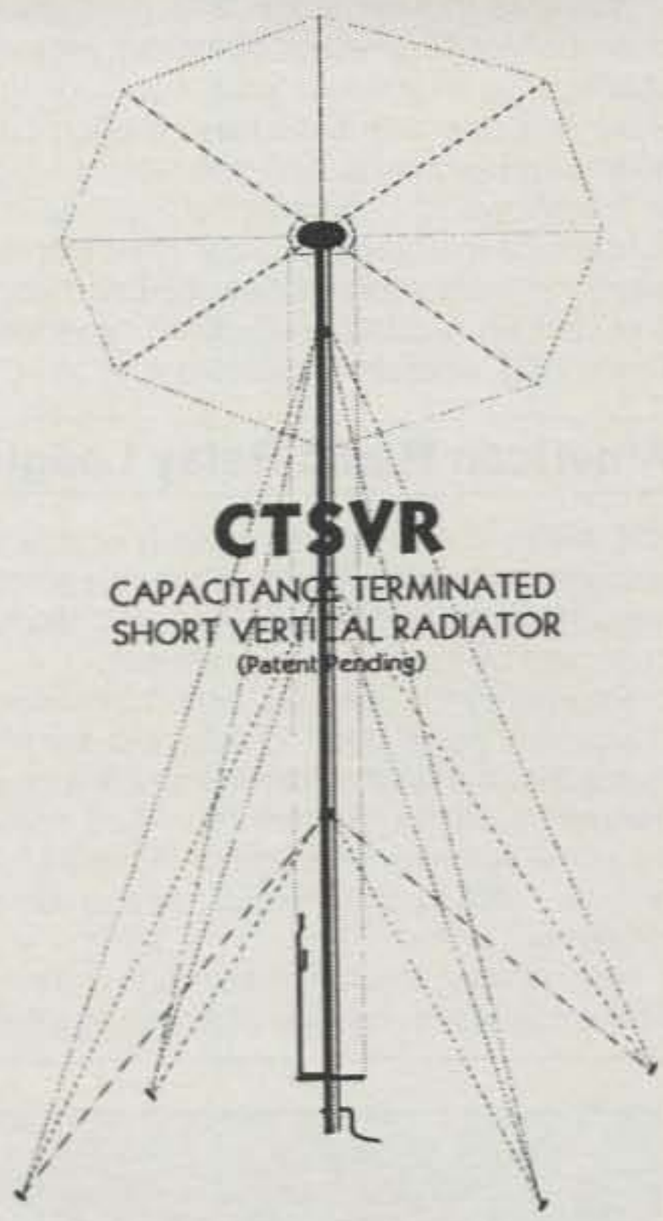

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becoming over crowded, there is no room for amateur 'broadcast' stations.

"I realize that some HF amateur transmissions benefit all amateur operators. However, after hearing an amateur 'preacher' quoting the *Bible* in a one-way broadcast fashion on 80 meters and another station conducting live call-in 'talk shows' . . . I believe the time has come to ban all of this type of activity. I feel that in the future more amateurs will 'join the band wagon' and start up regularly scheduled broadcasts. This is NOT what amateur radio is all about!"

American Radio Relay League

The ARRL comments essentially argue why stations in bulletin operation are not amateur radio stations and must not be held to the rules observed by most amateur stations.

Regarding the issue we would describe as "frequency ownership," for example, the ARRL states that the W1AW transmitters are fixed in frequency, which "permits amateurs interested in the bulletins to program those frequencies into memory channels on transceivers and receivers."

Very simply, the ability to program receive frequencies into memory channels applies to any class or type of station. This fact cannot exempt broadcasters from a standard amateur radio practice: identification and use of available frequencies suited to the conditions at a particular time.

"Shifts in operating frequency by W1AW in order to avoid any interaction with other stations would cause those who wish to receive the bulletins and code practice to have to search for the same," the ARRL contends, "and would defeat the purpose of the publication of the schedule and the regularity of the service."

We pointed out in our reply comments that searching for a desired station, especially within several kiloHertz of a known frequency, is a typical and ordinary element of HF operation and must be accepted by all amateur stations, including W1AW listeners.

Moreover, the inevitable result of absolute fixed-frequency operation on a schedule is that other stations will be interfered with. As **Don Simpson, KO4TA,** noted, " . . . the idea that because a schedule is published all radio operators should give way to the bulletin is unworkable."

FCC Engineer **Barry Bohac (Belfast, ME),** stated this fact most plainly in a Notice of Forfeiture to Glenn Baxter, K1MAN. Bohac wrote, "I find no merit in your contention that because you may have published a schedule, you were subsequently allowed to interfere with ongoing communications."

Intense users of the spectrum for broadcasting nevertheless cite this necessity for fixed-frequency operation as another justification for their interfering practices and permanent enfranchisement.

Carl Capps, N4TIE (Swansboro, NC), and **J. W. Morris, N4FFF (Nashville, NC),** note that one bulletin station " . . . comes on regardless of who is on frequency. He doesn't check the frequency and says that the FCC gives him authority to do this."

The ARRL states that "W1AW has not ever been alleged to create any significant interference to ongoing amateur communications in the admittedly crowded HF bands." That assertion may be true, but the FCC Rules apply equally to all amateur stations. The rules the ARRL cites for W1AW's apparent praise-worthy transmissions are the same rules cited by other broadcasters as justification for their violative activities. It is for this reason that we submitted a Petition for Rulemaking rather than only a request for enforcement action.

Merely arguing that W1AW is a responsible station does nothing to discourage others from abusing amateur privileges, especially when ARRL obviously believes W1AW need not observe basic operating practices. To the extent W1AW does not behave as an amateur radio station, and in fact publicly proclaims its need to operate otherwise, its high visibility prompts imitators to take to the air as psuedo-broadcasters.

ARRL argues, in essence, that its publications, its "warning messages," and the vagaries of HF propagation are sufficient to exempt W1AW from the necessity of ascertaining if the frequency it desires is available. But should broadcasters be permitted such an exemption from this most "fundamental of operating practices, namely, to monitor the frequency for use before transmitting"?

Although such monitoring may sometimes be less than completely effective, it is never wholly ineffective. The broadcaster's interference to ongoing communications may be unintentional, but it should take any necessary steps to mitigate the possibility of interference beyond publications and warnings.

The broadcaster itself also is a victim of current practices. As **Robert E. Nelson, WD9HSE,** observes, "Stations that can't hear a broadcast signal often transmit on or near its frequency in complete innocence. This routine happening in the bands is a problem that stations in two-way communication are able to deal with. A broadcast station isn't aware of the problem and continues to transmit with some or most of its coverage area rendered useless by interference."

We agree with **Don Simpson, KO4TA,** that if the Commission cannot limit one-way broadcasting entirely on HF, then the FCC should limit bulletins to digital modes. Simpson argues, "The egos cannot be nourished in that way." The ARRL implicitly concedes that it is in the voice subbands that one-way transmissions can have the most significant impact.

Accordingly, the Commission may wish to consider discontinuing the rules permitting one-way bulletin transmissions in the voice HF subbands only. We would be interested in hearing your views on the issue. See you next month.

73, Fred, W5YI

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- 600 watts.

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9140	40 meters	9112	12 meters
9130	30 meters	9110	10 meters
9120	20 meters	9106	6 meters
9117	17 meters		

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NEW AL-80B kilowatt output desktop linear can double your average SSB power output with high-level RF processing . . . it also runs cooler because its Eimac 3-500Z tube completely turns off between words . . .

Ameritron's all NEW AL-80B kilowatt *output* desktop linear can *double* your average SSB power output with high-level RF processing using Ameritron's exclusive *Dynamic ALC™*.

You get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias™* completely turns off the Eimac 3-500Z tube between words. It saves hundreds of watts wasted as heat.

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You get 1000 watts *output* on SSB, 850 watts *output* on CW, 500 watts *output* on RTTY, an extra heavy duty power supply, genuine Eimac 3-500Z tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatibility, Two-Year Warranty, Made in USA, plus much more for only $1195.

Dynamic ALC™ doubles average SSB power

The AL-80B's exclusive *Dynamic ALC™* gives you high-level low-distortion RF processing. When activated, it can more than double your *average* SSB power and produce up to 6 dB improvement in intelligibilty. It maximizes your talk power without distortion and splatter.

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The AL-80B's exclusive *Instantaneous RF Bias™* completely turns off the Eimac 3-500Z tube (except filaments) between words and dots and dashes. It eliminates hundreds of watts wasted as heat to give you cooler operation and longer component life.

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The guts of the AL-80B is its heavy ***heavy*** duty power supply. A 26 pound transformer using a high silicone steel core, computer grade capacitors, heavy duty bleeders and ten 3 amp, 1000 V power rectifiers give you a stiff 2700 volts fully loaded. Many amplifiers using *two* 3-500Zs use such small power supplies they don't deliver much more power output than the AL-80B.

NEW! $1195 Ameritron AL-80B Suggested Retail

Genuine Eimac® 3-500Z Tube

The AL-80B uses a *genuine* Eimac® 3-500Z tube warranted by Eimac® -- not cheaper, less reliable 3-500Zs used by some competitors.

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A tough low cost linear with REAL transmitting tubes!

Ameritron's new AL-811 linear amplifier gives you plenty of power to bust thru QRM. You get a quiet desk top linear that's so compact it'll slide right into your operating position -- you'll hardly know it's there . . . until QRM sets in. And you can conveniently plug it into your nearest 120 VAC outlet.

You get three tough vertically mounted 811A trans mitting tubes, extra heavy duty power supply, all HF band coverage, pressurized ventilation, tuned input, dual illuminated meters, adjustable ALC, standby switch, transmit LED, UPS shippable and much more.

Select the 3 tube 600 watt out AL-811, $649 -- or the new 4 tube 800 watt out AL-811H, $795.

70% efficiency

The AL-80B is built on a rugged steel chassis. It has a separate RF compartment that's fully shielded to keep RF from leaking out. This keeps RFI and TVI to a minimum.

Superb RF design and layout, Hi-Q tank circuit and commercially rated RF power components give you nearly 70% plate efficiency over the entire operating range. Your power goes into your antenna instead of heating up your amplifier.

A whisper quiet internal fan draws in cool air over power supply components and pressurizes the 3-500Z tube compartment to remove heat for longest life.

Tuned Input lets your rig deliver full output

A 50 ohm broadband Pi-Network *tuned input* is used.

Pi/Pi-L Output Network

A carefully designed Pi/Pi-L output network using the optimum Q for each band gives you exceptionally smooth tuning, extremely wide matching range, full band coverage and peak performance at all power levels.

Has ball bearing vernier reduction drives with logging scales on plate and load controls.

Step-Start Inrush Protection™

Step-Start Inrush Protection™ stops damaging inrush current with a start up sequence that's *easy* on your tube and power supply components.

Multi-Voltage Power Transformer

Ameritron's exclusive *Multi-Voltage Power Transformer* lets you optimize for different line voltage. You can select from 14 different *primary* voltages from 90 to 140 VAC and 205 to 250 VAC.

Dual Illuminated Cross-Needle Meters

Ameritron's dual illuminated cross-needle meters give you *four separate meters* to monitor your operating conditions -- you can tell right away if something is wrong.

QSK Compatible

The fast *custom* T/R (transmit/receive) relay in the AL-80B switches nearly as fast as some vacuum relay QSK T/R switches.

For *lightning fast* QSK operation use the optional external Ameritron *electronic PIN diode* QSK-5 T/R switch or the internal QSK-5PC. Please contact Ameritron for details.

Plus more . . .

An *Standby* switch lets you run barefoot, but you can instantly switch to full power if you need it.

Has transmit LED; 12 VDC, 200 mA jack; 12 VDC keying relay for solid state and tube rigs; tough, nearly indestructible Lexan-over-aluminum front panel. Two year limited warranty.

AMERITRON offers the best selection of legal limit linears!

These 3 rugged linears all use a super heavy duty hypersil power supply capable of 2500 watts!

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AL-1500
$2695.00
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Ameritron super power amplifier uses the herculean Eimac® 8877 ceramic tube.

It's so powerful that 65 watts drive gives you full legal output—and it's just loafing because the power supply is capable of 2500 watts PEP.

Ameritron's Dual 3-500Z linear

AL-82
$2095.00
Suggested Retail

This linear gives you full legal output using a pair of Eimac® 3-500Zs. Some competing linears using dual 3-500Zs don't give you 1500 watts because their lightweight power supplies can't use the tubes to their full potential.

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AL-1200
$2195.00
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Get ham radio's toughest tube with the Ameritron AL-1200—the Eimac 3CX1200A7. It has a 50 watt control grid dissipation—12 times tougher than the 4 watt rating of the 3CX800A7—yet you get the same full legal output as you get from a *pair* of 3CX800A7s.

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Ameritron — *the high power specialist* — brings you the ATR-15 antenna tuner that's designed for legal limit amplifiers. Heavy duty silver plated bandswitch virtually eliminates switch failure. High power transmitting capacitors. 1.8-30 MHz. Peak reading SWR/wattmeter. 6 position antenna switch. Selectable 1:1 or 4:1 balun. 5¼ x 13¼ x 13½ inches. Meter lamps uses 12 VDC.

Legal Limit Dummy Load

Oil cooled 50 ohm dummy load. Handle 1500 W for 5 min. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz. 7½" H x 6 5/8" D. **ADL-1500X** without oil, $39.95. **ADL-1500** with oil, $59.95

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Remote Coax Switches

RCS-8V
$149
Suggested Retail

RCS-8V, DC-UHF 5 KW Coax Switch. Replace 5 coax feedlines with one with this Remote Coax switch. Weatherproof box mounts outdoors on your tower or mast. Attractive control unit sits on your operating desk. Low SWR to 250 MHz. Usable to 450 MHz. Low loss. Rated at 5 KW to 30 MHz, 1 KW at 150 MHz. **RCS-8VN, $159.00** with "N" connectors.

RCS-4, $134.00, 4 position HF switch. Similar to RCS-8V. No control cable needed. Handles 1500 watts continuous.

RCS-4
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QSK-5 Pin Diode T/R Switch

$349 QSK-5 Suggested Retail

Self-contained, connects externally to most HF amplifiers. Handles 2.5 KW PEP, 2 KW CW. Six time faster then vacuum relay. 6x4x9½ inches.

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Stops power up inrush current and absorbs momentary high voltage spikes to your amplifier. ICP-120 for 110-120V or ICP-240 for 220-240 VAC.

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1995 CQ 160 Meter Contest High-Claimed Scores

The following scores are high-claimed scores only and are subject to verification. M/S indicates M for multi-op or S for single op.

SSB (Top 75)

Call	M/S	Score	QSOs
VE3EJ	S	562,848	1500
W2GD	M	441,720	1428
LX4A	M	404,834	878
OT5T	S	402,411	755
K1NG	M	394,509	1316
AB4RU	M	385,458	1468
VE3AQH	S	374,472	1081
WB9Z	M	351,450	1656
VE3RM	S	342,842	964
IR4T	M	301,516	619
CT1AOZ	S	262,592	437
UT5DK	S	245,106	885
AA8U	M	228,684	1315
KP2A	S	228,138	433
WR8C	M	222,225	1277
KX3Q	M	219,186	1131
VA2AM	S	217,005	651
S50K	S	214,839	547
AA1AA	S	212,520	1012
VE3DC	M	210,860	691
W3GH	S	210,820	1082
WD9INF	M	204,692	1223
WT3Q	M	203,187	931
NXØI	S	202,392	1227
CT8T	S	201,124	374
VE5RA	S	200,064	668
KD9SV	M	198,504	1206
N3MKZ	S	196,560	1044
N8ATR	M	195,450	1126
9A2TW	S	189,366	458
LY6K	S	188,955	646
G3NAS	S	185,760	258
NCØP	M	180,127	1125
KN2L	M	179,416	895
N3HBX	S	176,928	1009
N2IWE	S	175,725	1003
AA6TT	S	175,191	1088
OK1AY	S	168,116	539
IK1GPG	S	165,672	440
VE3PN	S	161,129	571
WØCEM	M	160,197	1076
HB9TA	M	158,405	451
WA1LNP	S	157,852	858
T94DD	S	157,251	412
WW2Y	M	157,112	614
7S3OWG	M	155,916	496
VE1UK	S	152,082	452
SV8CS	S	151,380	515
K1BNQ	S	150,220	845
K5XI	S	147,600	844
WZ4F	S	146,256	1005
DJ6QT	S	144,210	453
TA2DS	S	141,071	297
LY1FW	S	139,672	516
K1VWL	S	135,135	728
KAØSHC	S	134,225	929
N9ITX/7	S	133,300	935
AA4S	M	131,794	760
KØLIR	M	130,696	971
KØRW	M	130,158	947
AA4MM	S	128,920	514
K3JT	S	128,112	825
W3MM	M	127,500	708
VP5JM	S	127,166	328
W3TS	S	126,684	805
KX4R	S	125,856	804
NE3F	S	125,195	735
RK9XWH	M	123,950	266
SQ5O	S	123,648	429
T93M	S	121,353	399
S57DX	S	121,352	425
IK3SSJ	S	121,244	318
YV2IF	S	117,780	199
I6FLD	S	117,546	360
K5PGW	M	115,895	805

CW (Top 75)

Call	M/S	Score	QSOs
OT5T	S	953,697	1147
VP9AD	S	948,277	1293
P49I	S	883,449	804
G3ZEM	M	785,000	969
W2GD	M	694,309	1433
KP2A	S	675,700	917
VE3EJ	S	661,878	1224
XE2/W7WA	M	634,361	1199
OZ1LO	S	576,903	976
WW2Y	M	574,664	1245
PA6A	M	543,025	853
I4JMY	M	532,247	794
7S3OWG	M	509,565	823
SP5GRM	M	497,764	731
SN3A	S	489,826	795
OM7M	M	479,649	792
K5ZD	S	465,290	944
OHØ/OH1AF	M	463,930	1021
9A1A	M	463,505	838
DK1NO	M	459,756	745
K1NG	M	456,798	1050
PA3FNE	M	442,666	761
W7XR	M	438,593	1006
6D2X	M	437,888	907
AA1K	S	432,234	1171
KY1H	M	430,920	1181
DLØCS	M	428,544	677
OK1CM	S	426,412	793
N2LT	S	419,744	1204
LY6K	M	409,318	799
4X4NJ	S	405,244	508
ZF1DX	M	382,656	706
S59A	S	381,700	625
I4IKW	M	381,472	602
IT9ZGY	S	379,496	708
OMØA	S	376,890	752
KN8Z	M	376,877	1249
UA2FF	S	370,345	776
W3BGN	S	363,624	886
GM3YOR	S	358,592	534
W2XL/VE9	S	356,580	738
AB4RU	M	351,186	1248
N6DX	M	340,600	860
W3LPL	S	337,542	1046
HG5A	M	331,160	701
IL3/IK2NCJ	S	326,688	762
KC8MK	S	323,700	1019
KD9SV	M	319,584	1109
S5ØA	S	318,333	632
N2NT	S	312,500	908
OM8A	S	311,922	634
S58MC	S	311,320	627
LY1DR	S	309,507	687
VE3RM	S	308,760	731
G4BYG	S	308,754	500
K3WW	M	307,791	1010
HA8EK	S	304,380	610
IK2QEI	M	304,113	620
SP3KEY	S	294,636	621
VE3KP	S	293,025	780
W3UM	S	287,799	915
A71CW	S	285,250	444
KØRF	M	285,120	966
S59AA	S	284,830	556
KH6CC	S	282,429	450
OK5W	M	280,778	519
RK9XWH	M	280,566	451
F5IN	S	278,640	591
WB9Z	S	277,368	839
W4RX	S	276,576	925
OM5AW	S	273,910	564
9A2TW	S	268,090	538
S53M	S	264,272	533
UN2L	M	261,235	429
DKØKF	M	260,484	616

High-Claimed Club Scores

Club	Score
Frankford Radio Club	9,979,080
Southeastern DX Club	5,946,431
Slovenian Contest Club	3,443,895
Mad River Radio Club	3,120,331
Yankee Clipper Contest Club	2,717,362
North Coast Contesters	2,096,878
Potomac Valley Radio Club	2,043,281
Rhein Rhur DX Association	1,869,595
Bavarian Contest Club	1,852,879
Society of Midwest Contesters	1,608,430

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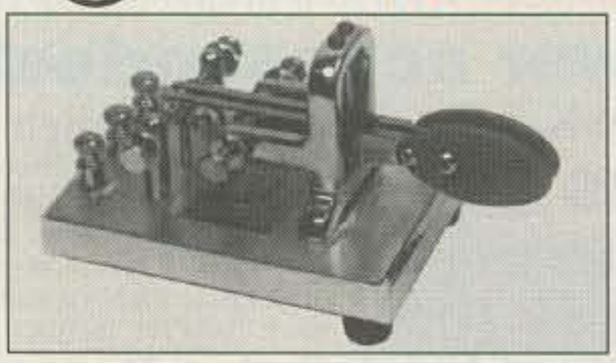

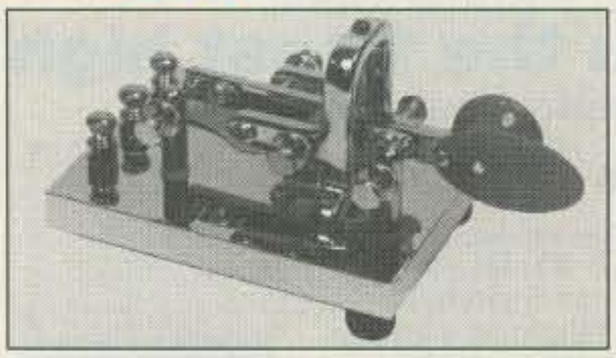

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Antenna Software by W7EL

EZNEC ("Easy-NEC") captures the power of the NEC-2 calculating engine while offering the same friendly, easy-to-use operation that made ELNEC famous. **EZNEC** lets you analyze nearly any kind of antenna *in its actual operating environment*. Press a key and see its pattern. Another, its gain, beamwidth, and front/back ratio. See the SWR, feedpoint impedance, a 3-D view of the antenna, and much, much more. Unlike MININEC-based programs, **EZNEC** lets you accurately model quads, long Yagis, and wires within inches of the ground. With 500 segment capability, you can model extremely complex antennas and their surroundings. True current sources and transmission line models are included. **EZNEC** requires an 80386 or higher CPU **with coprocessor**, 2 megs available extended RAM, EGA/VGA/SVGA graphics.

ELNEC is a MININEC-based program with nearly all the features of EZNEC except transmission line models, and is limited to about 127 segments (6-8 total wavelengths of wire). Not recommended for quads, long Yagis, or antennas with horizontal wires lower than 0.2 wavelength; excellent results with other types. Runs on any PC-compatible computer with 640k RAM, CGA/EGA/VGA/Hercules graphics. Specify coprocessor or non-coprocessor type.

Both programs support Epson-compatible dot-matrix, and HP-compatible laser and ink jet printers.

Prices - U.S. & Canada, EZNEC $89, ELNEC $49, postpaid. Other countries, add $3. VISA AND MASTERCARD ACCEPTED.

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CIRCLE 64 ON READER SERVICE CARD

cushcraft

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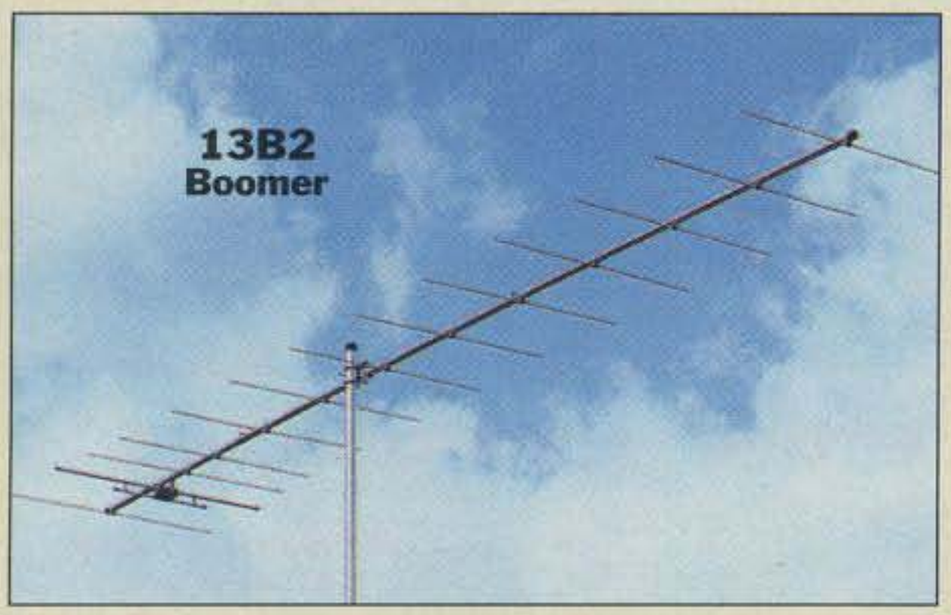
Cushcraft is the leader in new and innovative antenna designs to make your amateur radio operation more satisfying. Whether you are new to the hobby or have many years of experience there is a Cushcraft antenna for you. Call or visit your local dealer. He has Cushcraft antennas in stock.



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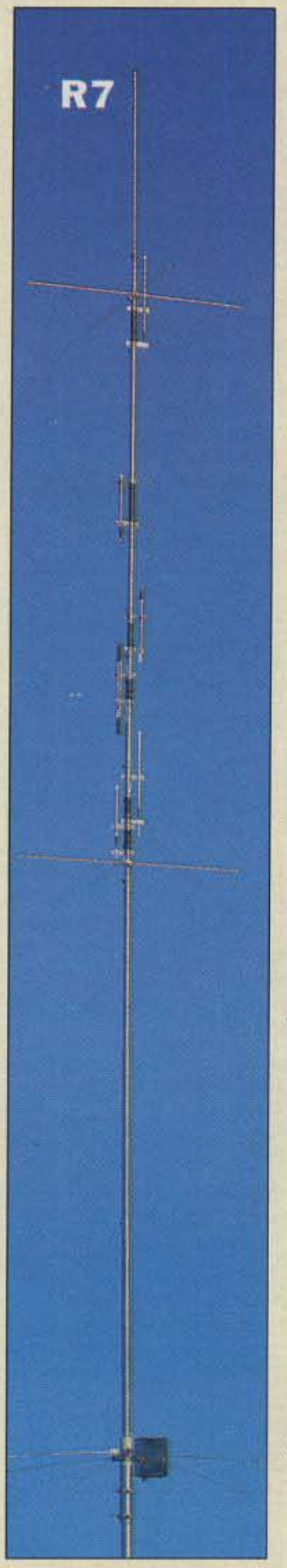
PERFORMANCE AND VALUE LEADERS. Our newest computer optimized 2 meter Yagis. ***A148-3S***, a 3 element compact for Packet, FM or even portable use. Easily rear mounted. ***A148-10S*** is one of our best value designs with excellent gain and front-to-back. Great for FM or full band 2 meter operation.



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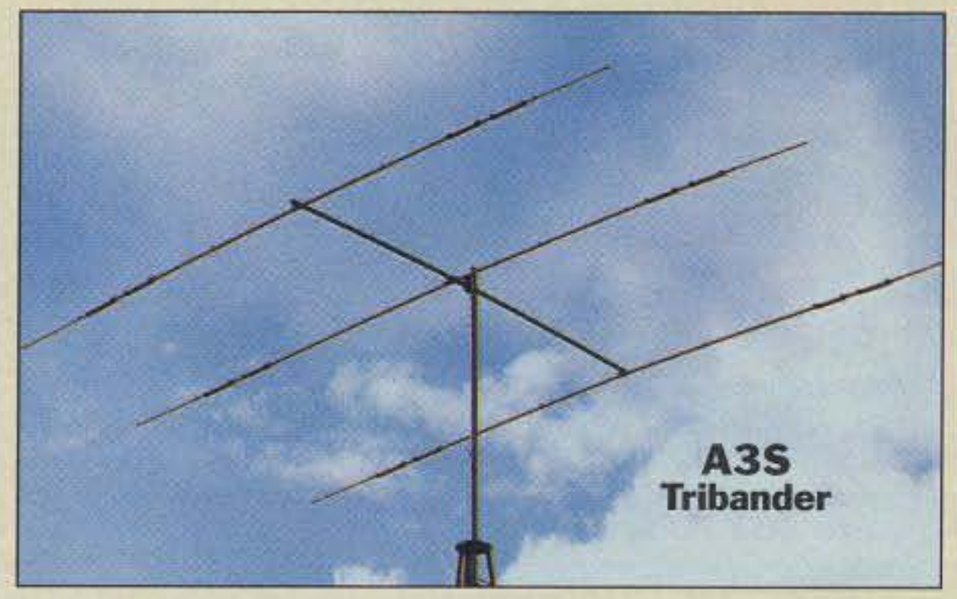

HF TRIBAND BEAMS. ***A3S*** - The most popular compact 10, 15, 20 meter beam. ***A4S*** - A high performance 18' long wideband beam. Both models come with stainless steel hardware and have optional 40 meter add-on kits.

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Dual Band Ringos. ***AR-270*** - Only 45 inches tall! A must for the new dual band transceivers covering 70 cm and 2m. ***AR-270B*** - This new dual band features high gain with a low angle of radiation and stands only 7.7 feet tall.
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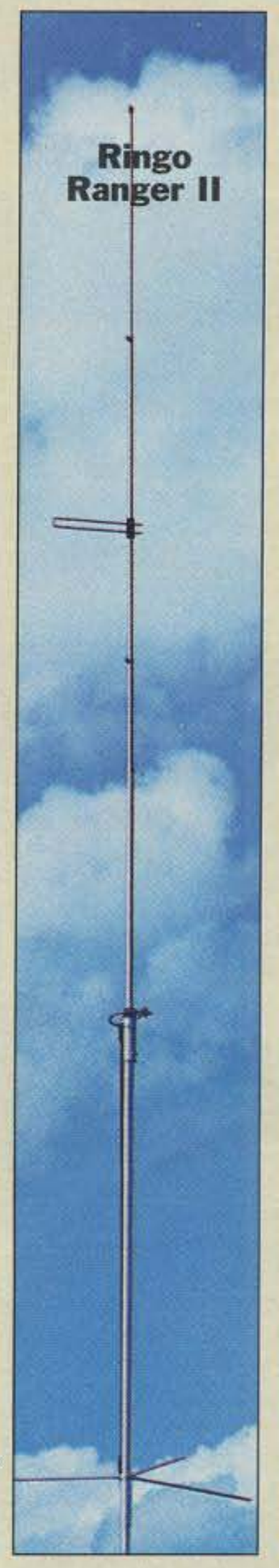

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FT-990 HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 90 memory channels • SCAF • FSP • DDS • high speed antenna tuner w/memories • AC power supply. 12¾"w x 4½"h x 11½"d, 30 lbs
FT-990DC • DC version w/o built-in AC ps.

FT-840 HF Transceiver • **rx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100 memories (independent tx/rx per memory) • Twin band stacking VFOs • optional FM • automatic 10M repeater offset with selectable CTCSS encode • 100W • 13.5V @ 20A • 9⅝"w x 3⅛" x 9½"d,18 lbs.

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FT-900/AT HF Transceiver • **tx:** 160 to 10m Amateur Bands • **rx:** 100kHz to 30MHz • 100W • 100 memories • built-in antenna tuner • front sub-panel optionally mounts separately from the main body • CTCSS encode with repeater offset • twin stacking VFOS.
FT-900 • does not have built-in antenna tuner.

FT-736R Multi-Mode U/V Full Duplex Base
2 meters: 144-148MHz; **70cm:** 430-450MHz • opt. modules for 50, 220MHz and 1.2 GHz • 100 memories • full duplex crossband with inverted tracking • 25w (144, 220 & 440MHz) 10w (50 & 1.2GHz) • built-in AC supply or 13.5 VDC • 5¼"h x 14½"w x 11½"d, 19.8 lbs.

FT-5200/6200 Dual Band Mobiles
32 memories • CTCSS encode • dual receive • built-in duplexer • cross band repeat • remote capability • 5½"w x 1⅝"h x 6"d, 2 lbs.
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FT-6200 • 440MHz/1.2GHz (35/10w)
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50 memories • DTMF page/coded squelch • backlit DTMF mic • 5½"w x 1½"h x 6¼"d, 2.8 lbs.
FT-2200 • 2m with 110-180MHz rx (50w).
FT-7200 • 440MHz (35w)

FT-7400H Mobile (left) • 440MHz (35w) • 31 memories • alpha display • track tuning • CTCSS encode • backlit DTMF microphone • 6¼"w x 1¾"h x 7"d, 3.3 lbs.
FT-2500M 2m Mobile (top) • 50w • 31 memories • CTCSS encode • scan • backlit DTMF mic • 6"w x 1⅞"h x 7"d,1½ lbs.
FT-912RH Mobile (right) • 1.2GHz

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FT-811 440 HT/TTP c/o .. **(w/$25 Coupon) $234.95**
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DR-150T 2m Mobile 50W • 144-148MHz tx, 174MHz (AM, FM) + 440-450MHz (FM) rx • two VFOs • direct frequency entry from microphone • 100 memories • channel scope • 3 scan modes • 9600bps ready • tone encoder • DTMF encoder • auto dialer • cloning • DSQ • 5⅞"w x 2"h x 7"d, 3¾ lbs.

DR-600TB 2m/440MHz Twin Band Mobile 45/35W • rx 118-174MHz (incl. AM) + 410-470 MHz • 40 memories • scan • full duplex cross band • remote from any DTMF capable 2m or 70cm unit • separate VHF/UHF outputs • separate controls for each band • CTCSS and DTMF encode • 5⅞"w x 2"h x 7"d, 3¾ lbs.

DR-610T 2m/440MHz Dual Band Mobile *New!* 50/35W • 144-148MHz tx, 108-174MHz (AM, FM) rx; 420-470 MHz tx, 438-450 MHz rx • 2 VFOs • 120 memories • channel scope • 4 scan modes • 9600 bps ready • CTCSS encoder • built-in duplexer • Bell • Priority • DSQ • 5⅞"w x 1⅝"h x 6½"d, 2½ lbs.

DR-M06T 6 Meter FM Mobile Transceiver Find exciting communications on the 50MHz band! • 50 to 54MHz • 100 memory channels • 10/1W output • Programmable offset, built-in • 50 tone encoder with decoder optional • DTMF microphone • 5½"w x1½"h x 4½"d.

DR-1200T 2m Data Radio • Optimum Packet • 25W • 1200/2400 baud • 14 programmable memories • 4 scan modes • programmable CTCSS encode/decode • voice transmission with optional microphone • 5½"w x 2"h x 6¾"d, 2.2 lbs.
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DJ-180T **DJ-580T** **DJ-F1T** **DJ-G1T**

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DJ-180TH • Same as DJ-180T, but 5W **is** standard ...**COUPON!** *(TH Only)* – **See List**
DJ-F1T 2m Mini HT • 2.5W • 130-174MHz & 118-136MHz rx • scanning • autodial • back lit keypad, 40 memories • call channel • CTCSS • DTMF encode • DSQ page • 4⅝"h x 2⅛"w x 1½"d, 14 oz....**CLOSEOUT $254.95**
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DJ-G1T 2m HT • 2m tx/rx + 440MHz and AM aircraft receive • Channel Scope • 80 memories • Crossband semi-duplex operation • DSQ paging • Scan • 4½"h x 1⅞"w x 1½"d, 12.6 oz ..... **COUPON!** – **See List**

DJ-580T
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$373.95 Net with Coupon until 7/31/95

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PROPAGATION

BY GEORGE JACOBS, W3ASK

THE SCIENCE OF PREDICTING RADIO CONDITIONS

Sunspot Plateau

Sunspot Cycle 22 appears to have reached a plateau, as it continues very slowly towards an expected minimum sometime between mid-1996 and early 1997.

The Royal Observatory of Belgium reports a mean sunspot number of 15 for April 1995. A daily value of 0 was observed on 11 days during the month. The highest daily value was 48, which was recorded on April 17. The mean level observed during April results in a smoothed sunspot number of 27 centered on October 1994. This is the third month in a row that the smoothed number has remained at the 27 level. Plateaus of this type are not uncommon within a solar cycle, particularly during the period of slow decline in which the cycle is now.

A smoothed sunspot number in the upper teens is forecast for August 1995.

Canada's Dominion Radio Astrophysical Observatory at Penticton, BC reports a corresponding 10.7 cm mean solar flux level of 78 for April 1995. This results in a smoothed value of 80 centered on October 1994.

Solar flux levels are a direct and more accurate measurement of solar activity than is counting sunspots. According to these measurements the cycle is continuing to decrease at a very slow rate. The smoothed 10.7 cm (2800 MHz) solar flux levels for the past three months have been 82 in August, 81 in September, and 80 in October. A smoothed level in the mid-70s is forecast for August 1995.

LAST-MINUTE FORECAST

Day-to-Day Conditions Expected for August 1995

Propagation Index.....	Expected Signal Quality (4)	(3)	(2)	(1)
Above Normal: 3, 9, 15, 25, 30	A	A	B	C
High Normal: 1-2, 6, 10, 16, 24, 26-27, 29	A	B	C	C-D
Low Normal: 7-8, 11, 13-14, 17, 20-23, 28	B	C	D	D-E
Below Normal: 4, 12, 19, 31	C	C-D	D-E	E
Disturbed: 5, 18	C-D	D	E	E

Where expected signal quality is: **A—Excellent opening, exceptionally strong, steady signals greater than S9.**

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S9 and S6, with some fading and noise.

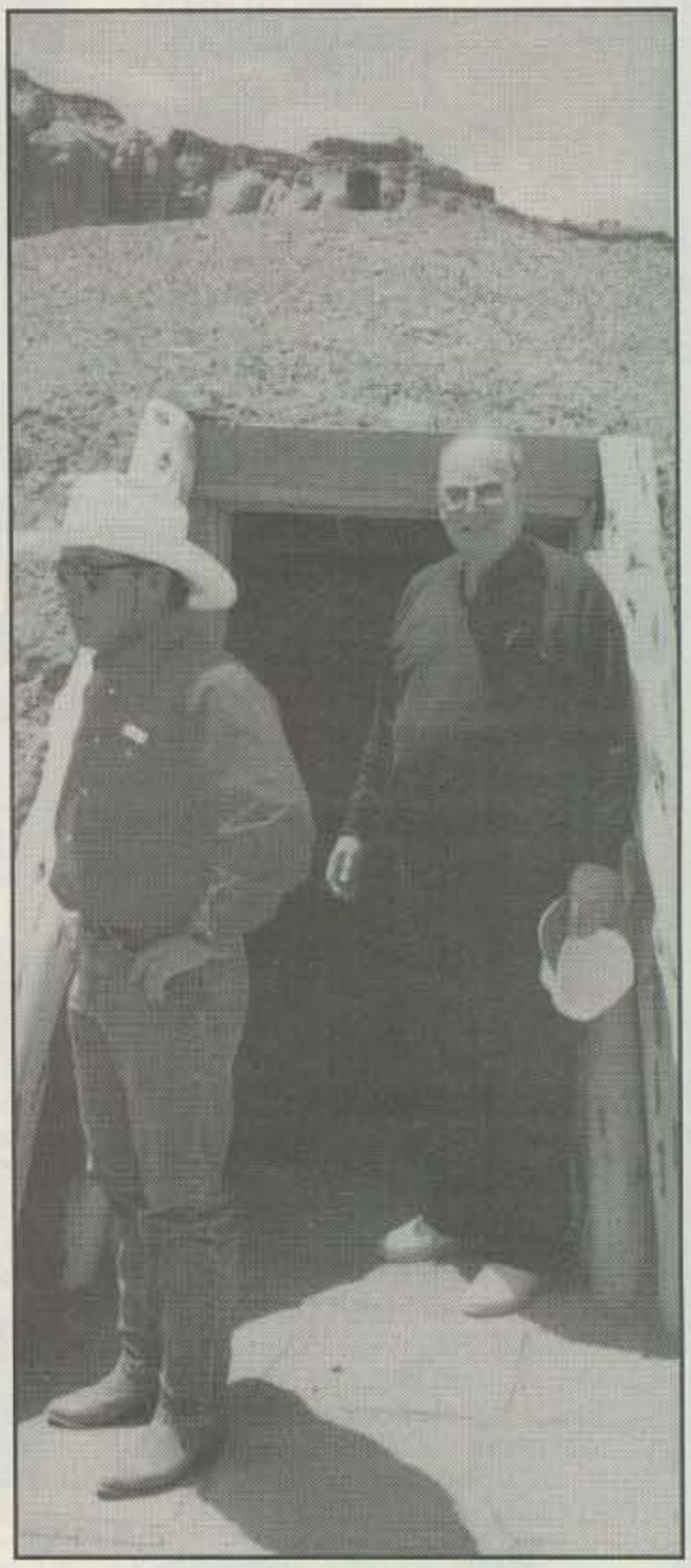
D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. **Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.**

2. **With the *propagation index,* use the above table to find the expected signal quality associated with the band opening for any date of the month. For example, an opening shown in the charts with a *propagation index* of 3 will be good (B) on August 1st and 2nd, excellent (A) on the 3rd, fair-to-poor (C-D) on the 4th, poor (D) on the 5th, etc.**



W3ASK (right) leaving a hogan (Navajo dwelling) after consultations with Native American wisemen concerning the possibility of "salting" the ionosphere during the upcoming 1995 CQ WW DX Contest. (Photo by Bea.)

Annual Ionospheric Salting

Over the past several years our "salting the ionosphere" expeditions have worked out quite well for the annual CQ World-Wide DX Contests. During the first days of June, as this column is being written, I have just returned from the Navajo Nation in Arizona, where I had consultations with the wisest of the wisemen dealing with nature. I was both honored and awed to have been permitted to discuss with them the possibilities of their supporting, in their own cultural manner, a "salting" of the ionosphere during the upcoming 1995 CQ WW DX Contest. This year a lot more "salt" will have to be used than during previous years because of considerably lower sunspot activity. If their methods for "salting" the ionosphere are as successful as the rain-making demonstration they put on for me, there is hope that propagation conditions during the 1995 contest may be better than expected.

August Propagation

During August 20 meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight when conditions are at least Low Normal. Peak conditions should occur for a few hours after local sunrise, and again during the late afternoon and early evening. Excellent short-skip openings are also expected on 20 from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of 2300 miles.

Not much DX is expected on 10 or 12 meters, but occasional openings towards South America should be possible during the afternoon, when conditions are High Normal or better. Look for frequent short-skip openings on 10 and 12 meters between distances of about 500 and 1300 miles.

There's a good chance for 15 and 17 meter DX openings towards South America and other southern areas during the afternoon hours, expecially when conditions are High Normal or better. Frequent short-skip openings are also expected throughout the daylight hours between distances of about 400 and 1300 miles.

Some fairly good 30 and 40 meter DX openings are forecast to many areas of the world from sunset through the sunrise period. Look for excellent short-skip openings between approximately 250 and 750 miles during most of the daylight hours, and between about 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should be possible on 80 meters during the hours of darkness. Expect conditions to peak just as the sun begins to rise on the "light" side of the transmission path. Try 80 meters for short-skip openings up to about 250 miles during the daylight hours, and between 250 and 2300 miles during the hours of darkness.

It's still too early for 160 meter DX openings on a regular basis, but look for the occasional one during the hours of darkness and the sunrise period. Short-skip on 160 meters looks good for the hours of darkness, up to distances of approximately 1300 miles, and possibly beyond.

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Specifications:
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Frequency Range: 1.8-60 MHz
Connectors: High Quality SO-239 (input/output)
Power Requirement: 9-12 VDC (AC adapter included)
Size: 5.3"(135mm)W x 5.75"(146mm)D x 3.5"(89mm)H
Weight: 1.2 lbs (.55kg)

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- Measurement Range: -60 dBm to +10 dBm (Log ref. level); 0.1 µV/div to 100 mV/div (Linear sensitivity)

With 8553B RF Section...$1995

- Frequency Range: 1 kHz to 110 MHz
- Scan Width: 18 calibrated scan widths from 20 Hz/div to 10 MHz/div in a 1,2, 5 sequence
- Bandwidth Range: selectable 3 dB bandwidths from 10 Hz to 300 kHz in a 1, 3, 10 sequence
- Measurement Range: -130 dBm to +10 dBm (Log ref. level); 0.1 µV/div to 100 mV/div (Linear sensitivity)

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Specifications:
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Mode: FM
RF Input: 0.5-5 Watts
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Power Requirements: 13.6 VDC @ 4 Amps

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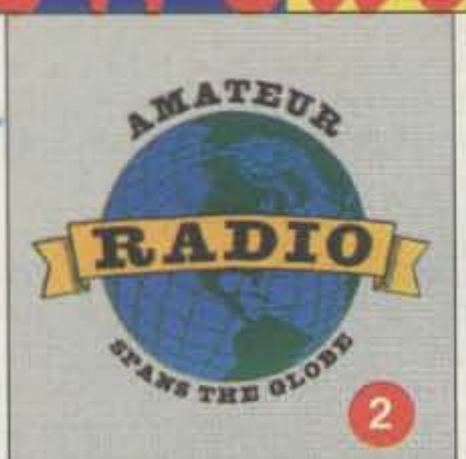

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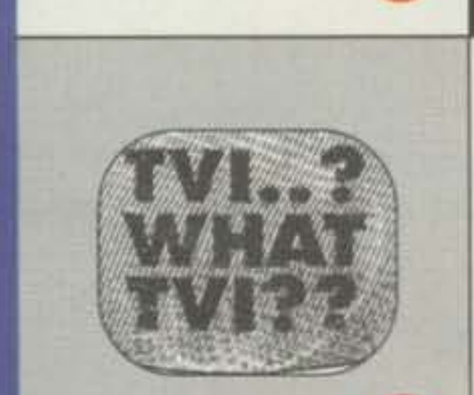

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McMurdo Sound, Antarctica	Nil	15-18 (1)	15-17 (1) 17-19 (2) 19-21 (3) 21-23 (2) 23-00 (1) 08-10 (1)	01-06 (1)

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Central & Northern Europe & CIS (former European USSR)	*Nil*	10-13 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-14 (2) 14-16 (1) 21-23 (1)	19-00 (1)
Eastern Mediter-ranean & Middle East	*Nil*	09-12 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 20-22 (1)	20-23 (1)
Western & Central Africa	*Nil*	12-15 (1)	06-07 (1) 07-09 (2) 09-14 (1) 14-16 (2) 16-18 (3) 18-19 (2) 19-20 (1)	21-01 (1)
East Africa	*Nil*	*Nil*	12-15 (1) 15-17 (2) 17-19 (1)	20-22 (1)
South Africa	*Nil*	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1) 20-22 (1)*
Central & South Asia	*Nil*	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1)
Southeast Asia	*Nil*	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-01 (1)	02-05 (1) 05-07 (2) 07-08 (1) 06-07 (1)*
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South Pacific & New Zealand	16-18 (1)	12-15 (1) 15-16 (2) 16-19 (3) 19-20 (2) 20-21 (1)	01-07 (1) 07-08 (2) 08-10 (3) 10-11 (2) 11-14 (1) 14-18 (2) 18-20 (3) 20-22 (4) 22-23 (3) 23-01 (2)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1) 23-02 (1)* 02-05 (2)* 05-07 (1)*
Australasia	15-18 (1)	13-16 (1) 16-17 (2) 17-19 (3) 19-21 (2) 21-22 (1)	12-19 (1) 19-20 (2) 20-01 (3) 01-04 (2) 04-07 (1) 07-08 (2) 08-10 (3) 10-12 (2)	00-02 (1) 02-03 (2) 03-06 (3) 06-08 2) 08-09 (1) 02-04 (1)* 04-06 (2)* 06-07 (1)*
Northern & Central South America	12-14 (1) 14-17 (2) 17-18 (1)	08-09 (1) 09-12 (2) 12-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (2) 08-10 (3) 10-16 (2) 16-17 (3) 17-19 (4) 19-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-03 (2) 03-07 (1) 20-22 (1)* 22-02 (2)* 02-05 (1)
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	13-14 (1) 14-16 (2) 16-17 (1)	08-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (4) 17-19 (2) 19-20 (1)	04-07 (1) 07-09 (2) 09-15 (1) 15-17 (2) 17-19 (3) 19-22 (2) 22-00 (1)	20-22 (1) 22-00 (2) 00-02 (1) 02-04 (2) 04-06 (1) 01-05 (1)*
McMurdo Sound, Antarctica	*Nil*	13-16 (1) 16-18 (2) 18-20 (1)	08-10 (1) 16-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-01 (1)	01-06 (1)

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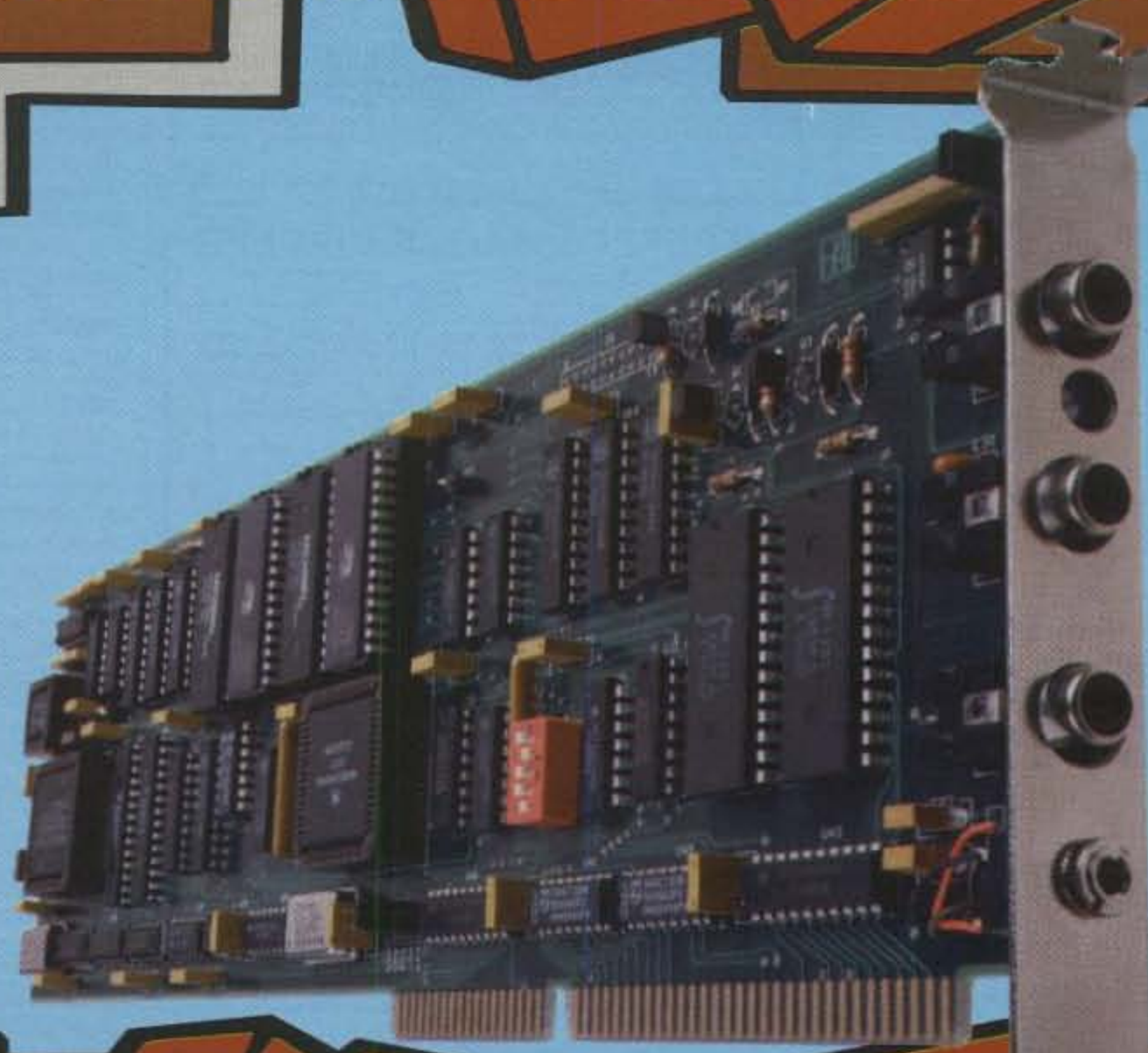

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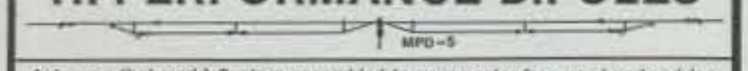

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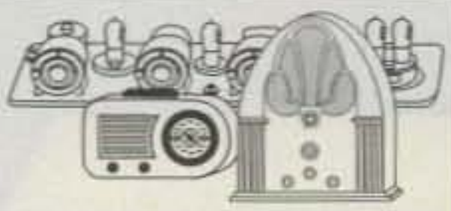

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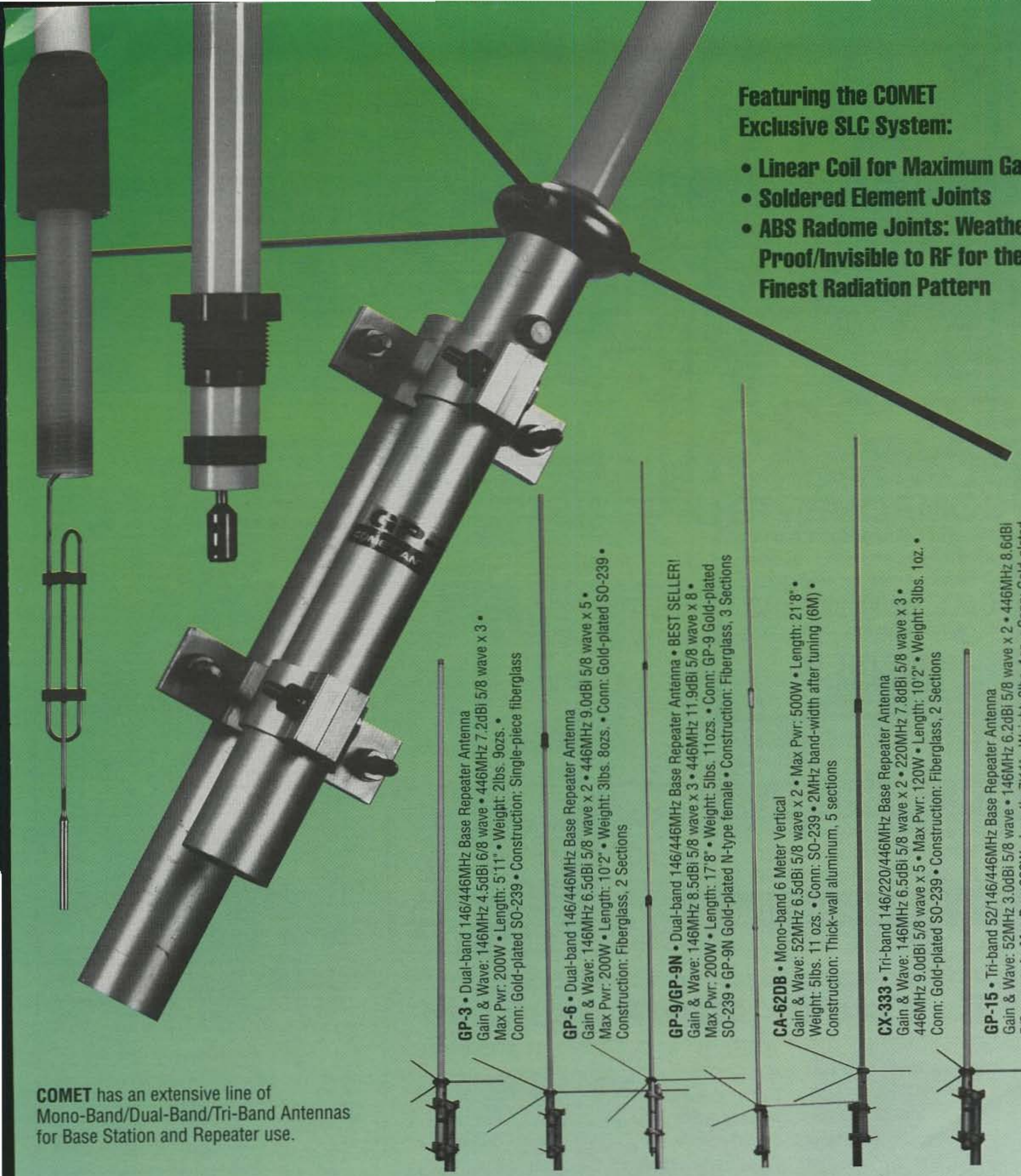

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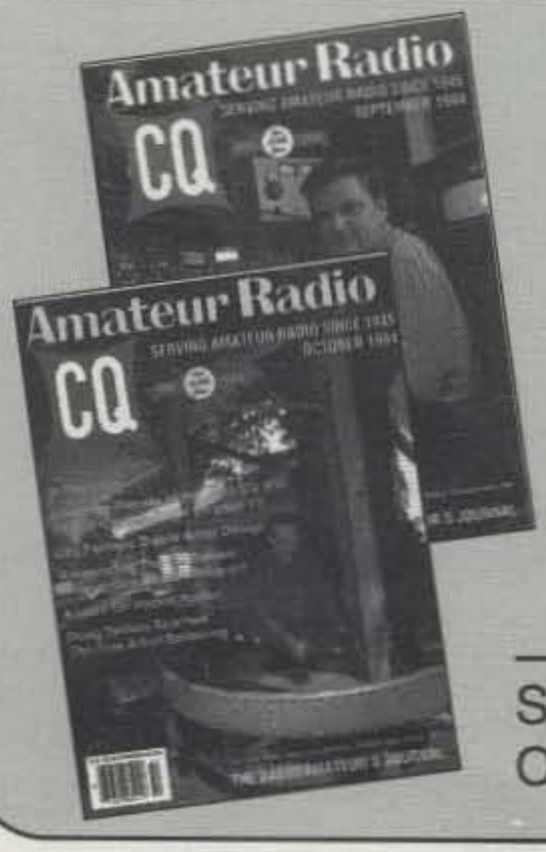

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WANTED: Have two Kenwood 2 meter Model TR-7400A radios. Need tone pad plugs, and touch tone pads for auto patch operation. J. May, 53d ASG, CMR 438, Box 1275, APO AE 09111.

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WANTED: Following two CQ technical series books: "RTTY From A to Z" and "The New RTTY Handbook." Paul Juen, WEØQ, P.O. Box 29, Vergas, MN 56587.

WANT: Nye Viking Model 322-003,heavy-duty SPEED-X Key, brass, with shorting switch. Bill, W6PRI, 408-996-7624, or C/B address.

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WANTED: 16th or 17th Edition W6SAI Handbook. Gene Ray, 2388 Hwy 36E., Milner, GA 30257.

WANTED FOR MUSEUM: Apple-1 and otherpre-1980 microcomputers. Also early micrcomputer journals, newsletters, and advertising literature. KK4WW, 703-231-6478/763-2321.

SHACK CLEAN OUT! Books, magazines, SWL-related stuff, and much more. $1 for several page list. G. L. Dexter, 213 Forest St., Lake Geneva, WI 53147.

WANTED: VFO for Hallicrafter HT-40 Xmitter. Junker EICO 722 VFO. Call 407-546-3847.

MAXON 49-F5 FM Communicator, $25.00. Walt Grosch, KZ9F, 1735 Stoneway Ct., Richfield, WI 53076 (414-628-1558).

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WANTED: Ameritron AL 80A Linear Amplifier or Heath SB-220 Amp. Also broadcast microphones and Shure microphones. James Lowe, W6JVK, 1521 Scenic Drive, Pasadena, CA 91103 (818-793-7374).

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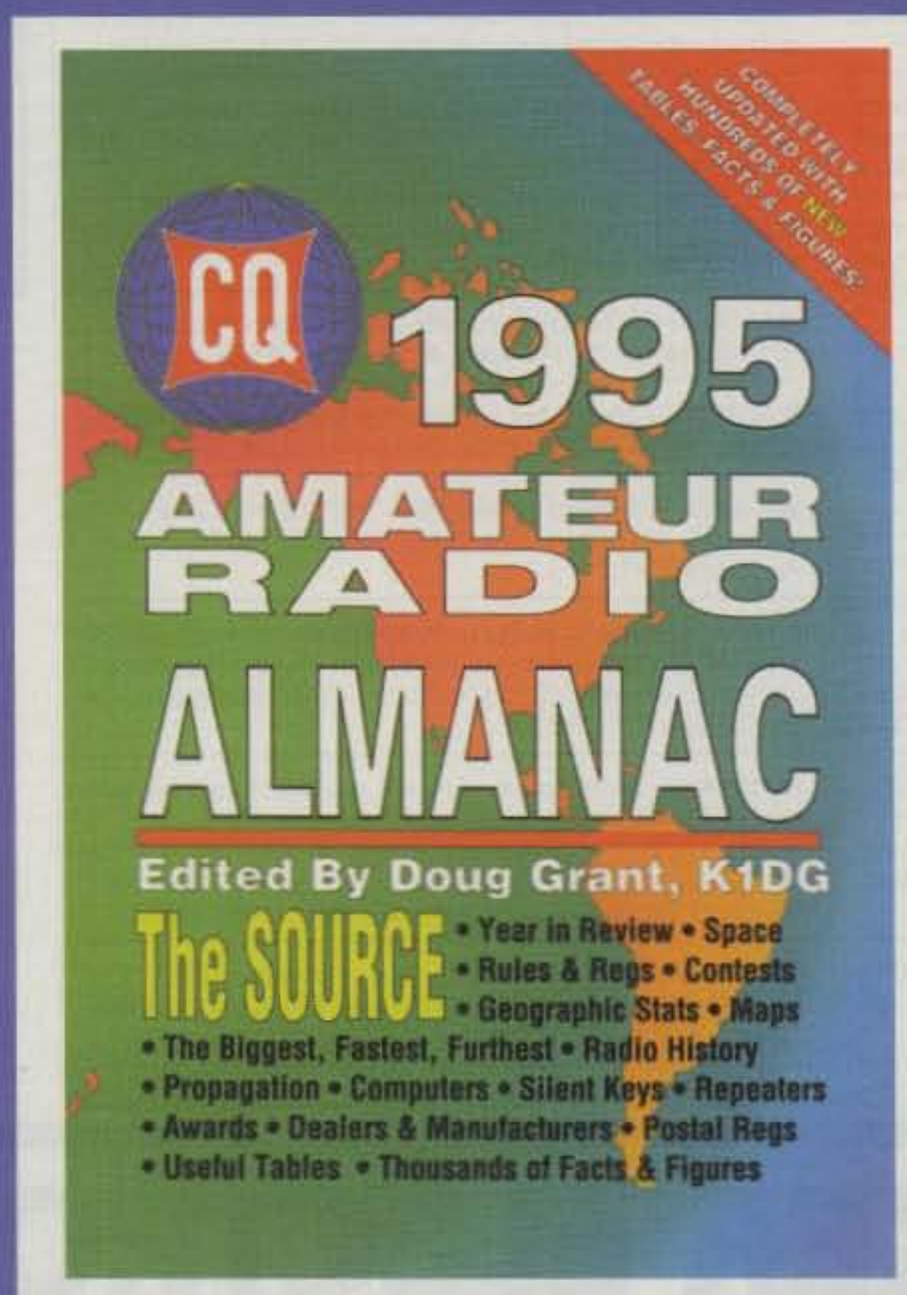

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Regulations
Amateur Radio Around the World
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QSLs
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Advertiser's Index

8Radio Sales....140
A & A Engineering....144
AEA/Adv. Elec. Applications....5
AMSAT....91
AMSOFT....92
ARRL....9,143
Ace Communications....30
Advanced Specialties....97
Affordable Electronic Repair....142
Alinco Electronics....10, 11
Alpha Delta Communications....140
Alternative Arts....122, 138
Aluma Towers....146
Amateur Elec. Supply....97, 128, 129
Amateur Radio Wise....115
Ameritron....125
Amidon Inc....97
Antennas West....42, 146
Antique Electronic Supply....115
Antique Radio Classified....142
Associated Radio....92
Astron Corp....31
Atlas Radio....84
Azden....42
Bamcom Communications....122
Barry Electronics....87
Beezley, Brian, K6STI....113
Bencher,Inc....124
Bilal Co./Isotron Ants....146
Buckmaster Publishing....115,146
Butternut Electronics....103
C & S Sales....85
CB City International....115
CQ Back Issues....146
CQ Books & Videos....52, 53
CQ KidsT-shirts....150
CQ New Books....148
CQ Merchandise....132, 133, 144
CQ Sweepstakes....137
CABLE X-PERTS....96
Comet Antennas/NCG....145
Command Productions....58
CommPute, Inc....147
Communication Electronics....93
Communications Concepts Inc....122
Computer Aided Technology....56
Connectors Unlimited....142
Cubex Co....140
Cushcraft Antennas....8, 127
Cygnus-Quasar Books....115
Dentronics....149
Diamond Antennas....2
Down East Microwave....90
EDCO/Daiwa....70, 79, 81, 83, 89, 91, 139
EQF....144
Fair Radio Sales....114
Falcon Communicatons....55
Force 12 Antennas....33
G4ZPY Paddle Keys....149
Gem QuadAntennas....108
Gordon West Radio School....77
HAL Communications....141
Ham Radio Outlet....12, 15
Ham Station....57
Harbach Electronics....92
Harlan Technologies....114
High Sierra Antennas....138
Hy-Gain by Telex....117
IC Engineering....142
ICOM America, Inc....7, Cov.IV
Index Laboratories....83
J. Martin Systems....71
Jade Products....114
Jun's Electronics....61, 63
K1EA Software....99
K2AW's "Silicon Alley"....105
KLM Antennas....39
Kantronics....19
Kenwood, USA....Cov. II,1

(continued on page 151)

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SIMPSON "A" 2M xcvr, D-104, 50 ohm VHF attenuator, 2M pre-amp, books, ham accessories, more. SASE lists. Bill Tucker, W4FXE, 1965 A-1-A, Apt. 15-G, Hallandale, FL 33009 (305-456-1349).

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WANTED: Hallicrafter HA-5 VFO,. EICO 722 VFO, Johnson Match Box Tuner 250. Call 407-546-3847 or 508-481-1364.

FOR SALE: QST/HR/73 & Misc. Publications. SASE. KA1VY, Ernie Guimares, P.O. Box 1262, Lakeville, MA 02347-7262.

WANTED: Millen MU Metal Shield with/without Bezel & Graticule for 3 inch round CRT. Call 802-657-2079.

WANTED: Aluma Tower Co. Crank-Up Ham Tower. Will pick up at your place. R. Main, Box 300622, Houston, TX 77230.

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MURCH UT-2000B 2KW Transmatch (roller inductor & balun) $229. Much Drake & Heath gear, parts, manuals. More. U-ship. List $1 & SASE. Joe Bedlovies, POB 139, Stratford, CT 06497.

FLUKE 97 SCOPEMETER. Like new with 4.0 software, hard case, extra probes, optical cable for computer control/software. New $2200, will sell for $1550. Call 305-680-6694 evenings, Davie, Florida.

WANTED: INSTRUCTION MANUAL and schematic for DENTRON GLA-1000 Amplifier. PY2YW, Antonio Demarinis, R.Galvota, 879 ap.22 Moema, 04522-032 S. Paulo SP BRAZIL.

HIGH-PERFORMANCE 50-ohm coax cable, Teflon, new, RG-225 $2.50/ft., RG-393 $3/ft. KLM KT-34XA Antenna, new (in box) $625. KLM 2M-16LBX, new $175. Collins 651-S1 Receiver $1495. Yaesu FL-7000 Amplifier, like new, $1695. Bird 43 elements, new $25% off. Alan, K6GA, 8956 Swallow Ave., Fountain Valley, CA 92708 (714-964-3912).

PROP PITCH MOTOR BRUSHES, parts, systems. SASE info. K6NA, 14250 Calle De Vista, Valley Center, CA 92082 (619-751-8610).

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WANTED: Following two CQ Technical Series books: "RTTY From A to Z" and "The New RTTY Handbook" by Byron Kretzman., WEØQ. Paul Juen, P.O. Box 29, Vergas, MN 56587.

COLLECTORS: Sell Heath HW-2036 with Micoder and manuals. In perfect operating condition. $125.00, U ship. Bill, K8TBW, 419-435-4127.

FOR SALE: 3.5 inch 720K IBM disk drive $15. Ken, KF8BC, 513-779-4148.

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NEEDED: Assembly manual and operating manual for the Heathkit Oscilloscope Model IOD-4540. Will pay for copies and mailing costs. Ken, KF8BC, 7716 Oceola Lane, West Chester, OH 45069 (513-779-4148).

WANTED: ICOM PS-35 (internal supply for IC-745, IC-751, etc.). Appearance unimportant but must be operational. John, W4FA, 302 Glasgow Lane, Greenville, NC 27858.

WANTED: ICOM IC-2AT, IC-3AT, IC-02AT, or IC-03AT. Local deal preferred. Glenn, AA8NT, P.O. Box 603, Dearborn Hts., MI 48127-0603.

WANTED: Yaesu FT-1000 in excellent condition. Have Yaesu FT-902-DM, w/patch to swap in. Must be cream puff; mine is. Mac, WR5A, 1701 Westside, Sherman, TX 75092.

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PROP PITCH MOTOR BRUSHES, parts, systems. SASE info. K6NA, 14250 Calle De Vista, Valley Center, CA 92082 (619-751-8610).

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COLLECTORS: Sell Heath HW-2036 with Micoder and manuals. In perfect operating condition. $125.00, U ship. Bill, K8TBW, 419-435-4127.

WANT: VHF-UHF television field strength meter. T.N. Colbert, 13609 Colony, Burton, OH 44021.

SIMPSON "A" 2M xcvr, D-104, 50 ohm VHF attenuator, 2M pre-amp, books, ham accessories, more. SASE lists. Bill Tucker, W4FXE, 1965 A-1-A, Apt. 15-G, Hallandale, FL 33009 (305-456-1349).

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Advertiser's Index *(cont'd)*

Lakeview Antennas....124
LaRue Electronics....75
Lentini Communications....121
Lewallen, Roy, W7EL....126
Lightning Bolt Antennas....149
Lucas Radio/Kangaroo Tabor Software....30
M2 Antennas....59
MD Electronics....62
MFJ Enterprises....45, 47
Maldol,USA....119
Martin Engineering, Glen....105, 142
Mirage Comm.Equipment....23
Motron Electronics....59
Mouser Electronics....146
Nemal Electronics....105
ONV Safety Belt Co.....108
Oklahoma Comm. Center....39, 119
OPTOelectronics....21
Outbacker Antennas....79
PC Electronics....89
PacComm....35
Palomar Engineers....107
Periphex Inc....37
Peter Dahl, Co.....138
Phillips-Tech Electronics....149
Polyphaser....82
Pro-Am....73
QSLs by W4MPY....42
QSLs by WX9X....114
R & L Electronics....49
RC Distributing....122
RF Applications....35
RF Connection....105
RF Limited....144
RF Parts....151
RT Systems....42, 108
Radio Bookstore....79
Radio Center USA....152
Radio Club of JHS 22....60
Radio Depot....106
Radio Engineers....149
Radio Place, The....99
Radio Works....101
Radioware....138
Ray's Amateur Electronics....30
Robert Hall Electronic....114
Rockwell....41
Ross Distributing....142
SGC Inc....139
Scrambling News....142
Sescom Inc....147
Solder-It....97
Spectrum International....58
Spider Antennas....62
Surplus Sales Of Nebraska....103
Svetlana Electron Devices....6
TE Systems....86
Tennadyne....115
Ten Tec....25, 27
Timewave Technology....111
Tucker Electronics & Computers....131, 147
US Radio....59
Uni-Hat Corporation....123
Universal Radio....150
VIS Study Cards....142
Vectronics....73
Versatel Communications....149
Vibroplex....126
W & W Associates....57
W5YI Marketing....108, 113, 138
W9INN Antennas....142
WJ2O Master QSO Logging Program....146
Wacom....90
Wireman Inc....146
Woodhouse Communications....85
Yaesu Electronics....66, 67, Cov.III-IIIA-IIIB
Yost & Co....142

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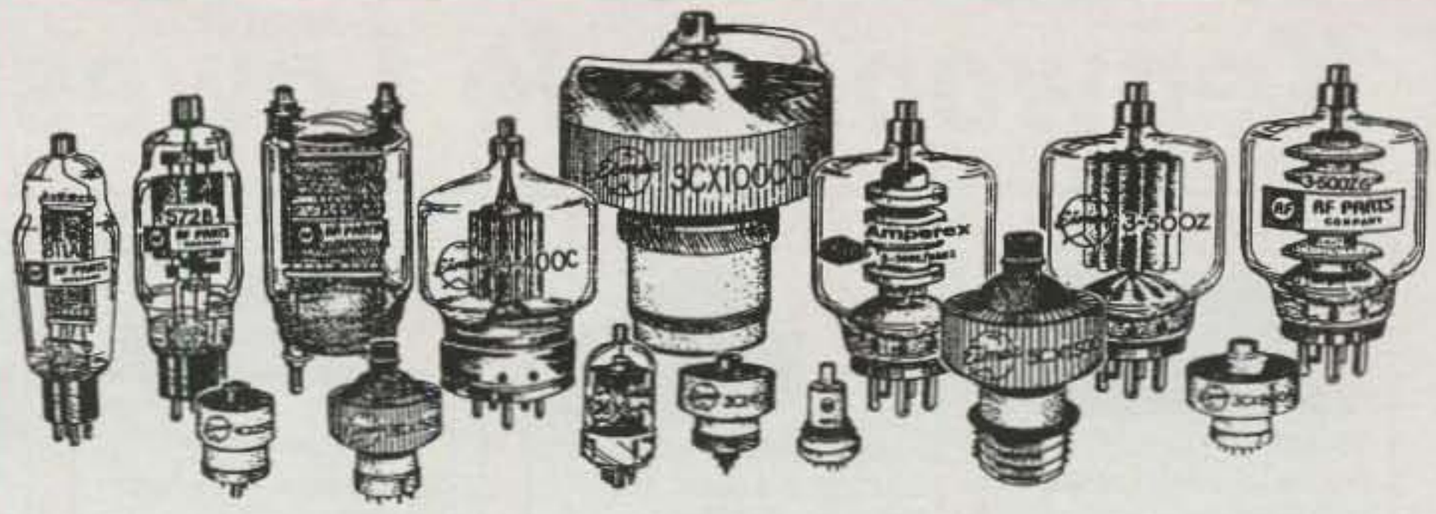

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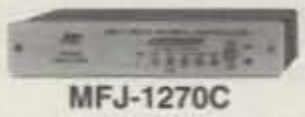

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  TX: 144-148 MHz
  70 cm: RX: 420-470 MHz
  TX: 430-450 MHz
- 120 Memory Channels (80 w/Alphanumeric)
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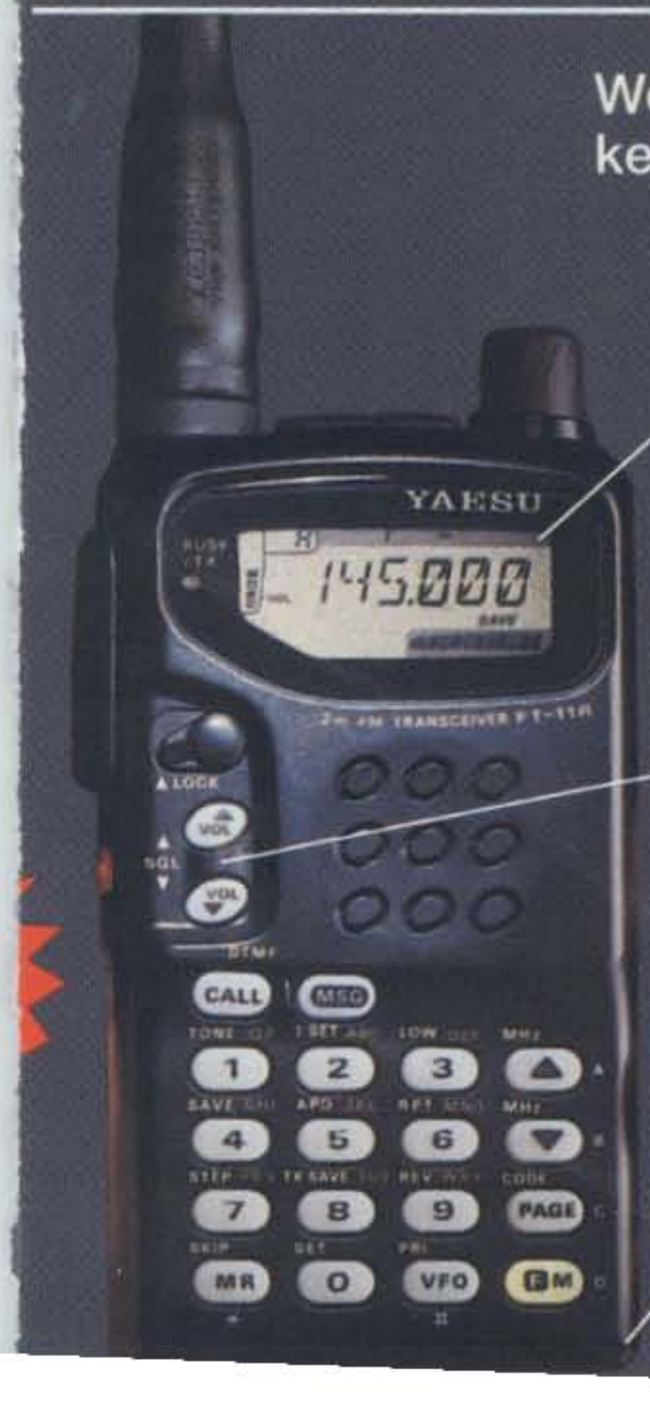

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Specifications

- Frequency Coverage:
  FT-11R 2 m: RX: 110-180 MHz
  TX: 144-148 MHz
  FT-41R 70 cm: RX: 420-470 MHz
  TX: 430-450 MHz
- Selectable Alphanumeric Display
- Compact Battery Design
  4.8V produces 1.5 Watts
  9.6V produces full 5 Watts*
- 150 Memory Channels (75 w/Alphanumeric)
- AM Aircraft Receive (110-136 MHz)
- Small Size:
  4" H x 2-1/4" W x 1" D
- RX/TX Battery Savers Built-in
- MOS FET Power Module
- Backlit DTMF Keypad and Display
- Backlit Up/Down Volume/Squelch Controls
- DTMF Paging/Coded Squelch
- Automatic Power Off (APO)

Accessories:
Consult your local dealer.

*FT-41R, 3.5 Watts

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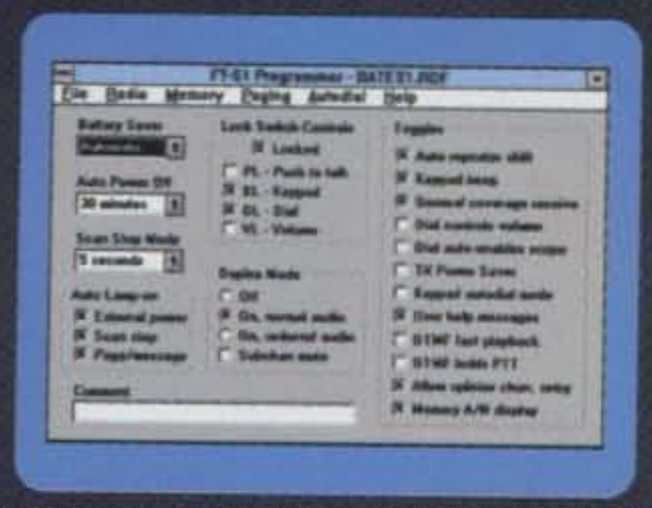
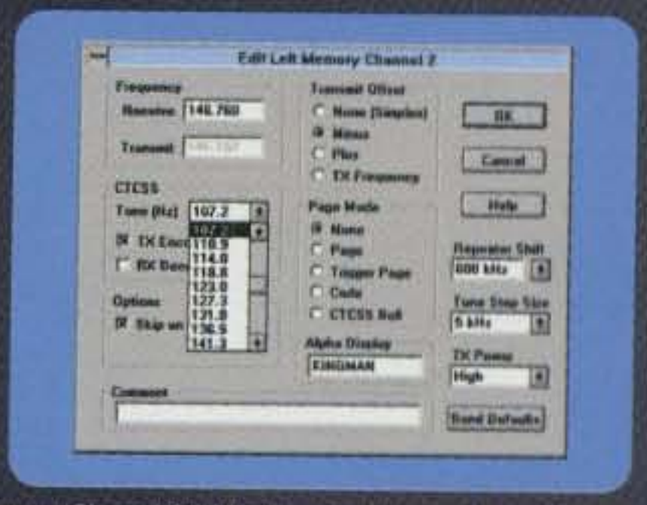


Main Window – Use the Main Window to customize your handheld the way you like it. For example, the Auto Repeater Shift and Keypad Beep Tone can be selected "on" or "off". When you are scanning, the Display Lamp can be programmed to light up when a Busy Channel is found.

Auto Dialer Edit Window – Programming the Auto Dialer has never been easier. Just type in your names and phone numbers and in less than a minute, all of your DTMF Auto dial Slots are programmed.

Memory Listing Window – Memory Channels can be displayed independently. At a quick glance you can view up to 22 memory channels in a single window. Frequency, CTCSS, Encode/Decode, Scan Skips, and Alpha Names are all displayed for quick and easy changes.



Memory Channel Edit Window – Each Memory Channel has a detailed window. With a simple click of the mouse, you can program the following for each memory: Frequency, Alpha Name, Repeater Offset, CTCSS, Power Level, Channel Step Size and more!

Only Yaesu lets you program with the ADMS-1 Windows™ software or from the HT keypad.

Unlock all the features of your FT-51R and FT-11/41R HTs, with a simple "point and click!" Full programming, and all of the benefits of Yaesu's star performing dual band and 2-meter HTs are yours in minutes. Simple to use! Installation and operating instructions are on a single page. And there's a Programmer Help window for each radio. Use ADMS-1 to download from HT to PC, then clone the information to another FT-51R or FT-11/41R HT instantly! And, create memory Files for each city you visit. Add the frequencies —including alpha names, CTCSS tones and so on for repeaters, then load and go! Affordable for everyone, ADMS-1 Windows™ software is a neat little package that will change your HT use forever.

Conventional programming is always straightforward and practical with Yaesu radios. The FT-51R and FT-11/41R are no exceptions! You'll enjoy exploring each feature-packed HT from the keypad as you make your radio uniquely "yours".

ADMS-1 Windows™ Software Kit
3.5 Floppy Disc and Programming Cable with DB-25 Connector.

5 Watt Version Available Now!

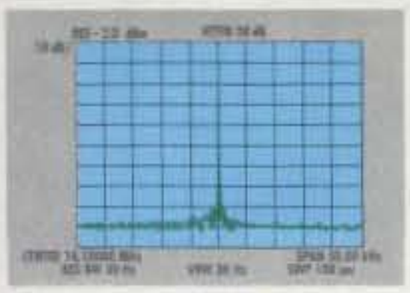
Specifications subject to change without notice. Specifications guaranteed only within amateur bands. Some accessories and/or options are standard in certain areas. Check with your local Yaesu dealer for specific details. Windows is a registered trademark of Microsoft Corporation.

Expand Your Horizons to 6 Meters!

NEW from ICOM

IC-736: 6 Meters and HF!

- ☐ HF and 6 Meters!
- ☐ 100 W Output for Both HF and 50 MHz
- ☐ Internal AC Power Supply
- ☐ Automatic Antenna Tuner (Covers 6 M to 160 M)
- ☐ Dual Antenna System
- ☐ 100% Full Duty Cycle
- ☐ Newly Developed DDS Circuit for 1 Hz Fine Tuning Resolution
- ☐ Quick Split Function (with pre-programmable offset)
- ☐ MOS-FET "Class A" Audio
- ☐ Multi-Function Meter (4-in-1)
- ☐ Double Cooling Fan
- ☐ Selectable Filters
- ☐ 10 dB Pre-amp, 20 dB Attenuator
- ☐ Built-in Electronic Keyer
- ☐ RIT, ΔTx, ΔRx
- ☐ 10 Key Pad
- ☐ VOX
- ☐ RF Gain
- ☐ 101 Memory Channels
- ☐ Passband Tuning
- ☐ AF-type Speech Compressor
- ☐ CW Full Break-In
- ☐ Notch Filter
- ☐ Noise Blanker
- ☐ Large Display



Transmitter C/N Ratio

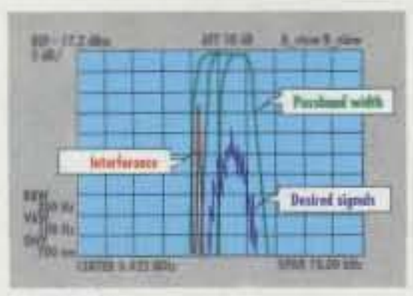
Now you can work all of the HF bands AND have access to one of the most exciting amateur bands – 6 M! The IC-736 is an all band, all mode transceiver with a general coverage receiver. Only an antenna, coaxial cable and AC outlet are necessary to get up-and-running with this rig. Cutting edge features and "plug 'n play" operation make the IC-736 a "complete station in a box!"

The IC-736's compact and cleverly designed **Automatic Antenna Tuner** has preset memories for each 100 kHz step, thereby providing very high speed tuning. Tunes all ham bands plus 6 M!

Equipped with **2 Antenna Connectors,** the IC-736 includes an **Automatic Antenna Selector.** In each band, the band memory memorizes the selected antenna so you don't need to change an antenna manually each time you change the operating band.

The IC-736 employs power **MOS-FET's** in the driver and final amplifier stages, providing a clean, 100 W of output power over all of the ham bands as well as the 50 MHz band.

An **Aluminum Die-Cast Frame** and **2 Large Cooling Fans** help stabilize the



PBT Characteristics

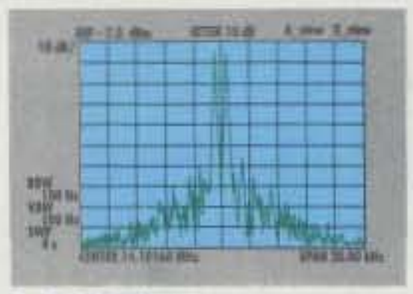
IC-736's PA circuit to obtain 100% full duty cycle operation. Performance you can count on under the most demanding of conditions.

CW fans will love the IC-736. The **Full Break-In Function** (QSK) allows you to receive signals between transmitted keying pulses (semi break-in is also available). **Separately Designed CW Key Jacks** allow you to connect both a memory keyer and a paddle – great for contest operation!

The **Double Band Stacking Register** memorizes 2 frequencies along with modes in each band so it can be used like 2 VFO's in one band.

Up to 10 **Electronic "Memo Pads"** are available. This is especially useful during contests or while DX hunting. When catching a station you would like to temporarily store, simply push the memo pad-write button. The frequency and mode is automatically stored in a memo pad so you can continue band searching.

For interference rejection, the IC-736 has **Passband Tuning** and a **Notch Filter.** During crowded band conditions, these two functions can be used in combination, providing an extremely effective method of reducing most types of interference.



3rd IMD Characteristics

The **RIT** and **ΔTX** functions independently change the receive or transmit frequencies, respectively. Great for split frequency operation or for compensating for the frequency drift of another station.

The IC-736's offset frequency for **Quick Split** Function can be pre-programmed. A **Split Lock** function prevents you from mistakenly changing the receive frequency while changing the transmit frequency.

A newly designed **DDS** (Direct Digital Synthesizer) provides frequency resolution to an exacting 1 Hz. Rotate the main dial and experience the comfortable analog feeling of fine tuning. One complete dial rotation is equal to 200 Hz.

Call (206) 450-6088 for FREE Literature!

View a video demonstartion of this product
VHS
at your participating ICOM dealer today!

ICOM America, Inc. Corporate Headquarter
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